

PROVOST'S OFFICE

JUNE 11, 2008

DEAN OF THE FACULTY

Department/Program: Chemistry

Chair/Director: Cristina Suarez

Retreat Date: June 11<sup>th</sup>, 2008

**Departmental/Program faculty in attendance:**

Cristina Suarez  
Robert Linck  
David Bickar  
Kate Queeney  
Kevin Shea  
Shizuka Hsieh  
Elizabeth Jamieson  
Maureen Fagan  
Maria Bickar  
Heather Shafer  
Smita Jadhav

**Outside guest(s)/speaker(s) in attendance:** None

**Goals:**

- 1) Address Intellectual Capacities
- 2) Address Capstone Experience
- 3) Address Pathways through the Major
- 4) Address Ongoing Curricular Discussion regarding major course requirement

**Outcomes:**

- 1) A decision was made to change the requirements of the major, and officially establish pathways through which students can better address their chemical interests.

**Plans to achieve outcomes:**

**How do your plans advance departmental goals as outlined in mid-term or decennial reports?**

See provided recommendations from Decennial Review 2006.

**How does the departmental/program plan to integrate the list of intellectual capacities into the major? For instance, are specific capacities such as writing, speaking or quantitative skills developed in particular courses, or a series of courses?**

The Chemistry department is committed to enhance the writing, speaking and presenting abilities of all our students (majors, minors and non-majors). Throughout our curriculum we ask our students to write numerous papers and lab reports. The typical introductory course asks for an average of five lab reports per semester, each of an average of five pages including figures. Longer papers and reports are required for the majority of our upper-division courses. These papers are often based on primary literature and are graded not only on content but form. Students work with our faculty and the Jacobson Center to improve their writing. We also firmly believe in the necessity of students to be able to successfully communicate their scientific knowledge. In many of our courses, the presentation of techniques, individual projects and primary literature is a must. Students are given feedback and are often graded in their performance. Many of our students also get a chance to present professionally in a variety of national, regional and campus meetings, enhancing the number of opportunities to improve their presentation skills. The study of science in general, and chemistry in particular, is based on

quantitative analysis; therefore, students taking chemistry learn how to master all sorts of quantitative skills.

**Of the specific curricular goals identified by the faculty which would be furthered within the major? (see page 8 of the Smith catalog for further examples)**

- I. **Develop the ability to think critically and analytically and to convey knowledge and understanding**
- II. **Develop historical and comparative perspectives**
- III. **Become an informed global citizen**

Critical and Analytical thinking is an essential component of the study of chemistry and as such it is thoroughly emphasized throughout the curriculum. Part of the ability to think rationally is to be able to engage in logical dialogue. Our courses incorporate the learning, practice and improvement of fundamental communication skills, both writing and oral. Most courses emphasize these skills in the form of oral class presentations, either individually or in groups, and in the form of poster presentations. Advanced students do so at regional and national professional meetings.

The study of chemistry is inherently linked to its history. The teaching of the scientific method must include an understanding of the development of ideas, principles and hypothesis. In this context, students get exposed to historical and comparative perspectives.

Our chemistry courses, both major and non-major, offer students the ability to increase their understanding of sustainable development, the environment, technology, public health, nutrition and food supplies, the arts and global security.

**Has the department integrated the development of student research abilities in the structure of the major? For instance, is there an information literacy program in place for students who major in the department? Is there a research methods course recommended for your majors (either in your department or another one)? If so, when in the student's career does she take this course?**

The department currently does not have a research methods course per se, because we prefer to integrate the development of student research abilities in the whole structure of the major and minor. Our curriculum offers multiple introductory laboratory courses where basic techniques and procedures are introduced. At the upper-division level, advance laboratory courses allow students to increase their ability to conduct independent research with state-of-the-art instrumentation. Students learn to work with primary literature in their class papers and reports throughout the curriculum. We have found the assistance offered by the Young Science Library to work with our classes in preparing our students to do library work invaluable. We sincerely hope the assistance continues. In general, the Chemistry department is also firmly committed to offer all students a research opportunity outside the classroom, and as such we are active participants in both STRIDE and AEMES programs, which target first and second years, special studies and Honors. Our faculty also dedicate at least ten extra weeks over the summer to work with students. The number of students participating in this summer program has increased over the years, many of them continuing their research projects over the next academic year.

**Are the pathways through the major clear for prospective majors? Is the department satisfied with the level of advanced work accomplished by its majors? (It may be useful to review the transcripts of graduating majors, or to examine the course taken patterns of several recent groups of senior majors.)**

During this retreat, we finalized our decision to change the requirements for the chemistry major. Our main goal was to decrease the number of required core course and introduce more choices in order to infuse more flexibility in the major. This flexibility will allow students to choose better their programs of study according to their interests, to start the major in their second year at Smith more easily and to better participate in junior year programs. We understand that this flexibility will require increased individual student advising and we are committing to doing so. Our intention is to create a chemistry major more suited to the needs of our students and more in-tune with the diverse career choices that our chemistry graduates want to make. A proposal to change the number of required courses from 11 to 10 and to expand the number of electives available (both departmental and interdepartmental) will be presented to CAP at the end of the summer.

Currently there is a single pathway through the major. We are in the process of creating a structure that would allow different pathways. The pathways will be designed as a set of core courses and possible electives, either in or out of the department, to better highlight different chemical interests. Looking at student interest and current directions in our field, we have agreed to design three possible different pathways through the major: Professional, Environmental Chemistry and Chemical Biology. We are in the process of including and describing all these pathways in the College catalogue and the departmental web pages.

**What are the culminating or capstone experiences for students in your major?**

The chemistry major as it stands and even after the proposed changes does not highlight one specific course as a capstone experience. We have designed our major to be built from the ground up and therefore students are aware of the pyramidal structure of the curriculum. Once the basics are introduced in our general and basic organic chemistry courses, the students use this knowledge to work on independent projects in courses such as CHM326 (Synthesis and Structural Analysis) or CHM332 (Physical Chemistry II). Material learned in this second tier coursework is then applied to elective courses such as CH337 (Materials Chemistry) or CHM357 (Pharmacology and Drug Design). In the department, we strongly believe as well in the value of research experiences as a way to show students how to bring different ideas together with the goal of solving a particular question. We try to provide all our students, not just our own majors, with such an opportunity. We tell our students that an Honors thesis or senior-year special study is the culmination of such work.

**Please attach a summary of any proposed changes to be considered by the department and any associated timeline for changes to be submitted to CAP.**

The following are proposals in preparation that will be presented to CAP by the end of this summer:

- 1) Change in credits (from 3 to 4) of the following courses: CHM326, CHM336, CHM346, CHM328 and CHM357. This is necessary to better reflect the current content and work load of these courses.
- 2) Change to the number of courses required for the chemistry major (from 11 to 10) and its consequent change in number of credits (from minimum of 42 to minimum of 37 units).
- 3) Change to the type of courses required for the chemistry minor (more flexibility).