

**ASSESSMENT PLAN**

**for**

**GRADUATE PROGRAM**

**DEPARTMENT OF CHEMISTRY and BIOCHEMISTRY  
CALIFORNIA STATE UNIVERSITY , HAYWARD**

**LARRY G. SCHEVE**  
Graduate Coordinator

**RICHARD T. LUIBRAND,**  
Chair  
Department of Chemistry and  
Biochemistry

**Spring, 2003**

## INTRODUCTION

This assessment plan enumerates the assessment goals, methods, and criteria that have been developed by the Department of Chemistry and Biochemistry to assess the Chemistry Graduate Program. The specific goals are presented in a logical and chronological order. Each goal is stated and then, a specific assessment method(s) is presented, followed by implementation of the assessment and assessment criteria. Importantly, this assessment plan is multifaceted and comprehensive. It will serve as an excellent tool to monitor both student and department performance.

**It should be noted that the Department of Chemistry and Biochemistry offers three different Graduate Program Options/Plans:**

- 1) MS-Chemistry (Plan A -Thesis)**
- 2) MS-Chemistry (Option in Biochemistry; Plan A -Thesis)**
- 3) MS-Chemistry (Plan B -Comprehensive Examination)**

Therefore, assessment of each separate plan/option may vary.

## ASSESSMENT GOALS AND METHODS

**ASSESSMENT GOAL No. 1:           STUDENTS APPLYING TO THE CHEMISTRY GRADUATE PROGRAM SHOULD HAVE SUFFICIENT PREREQUISITE ACADEMIC ABILITY AND TRAINING TO WARRANT ADMISSION INTO THE PROGRAM**

The primary requirements for admission into the program are as follows: 1) possession of an undergraduate degree in chemistry equivalent to a chemistry degree earned from California State University, Hayward and 2) an upper division GPA of at least 2.6 in upper division chemistry and biochemistry courses. Therefore, students applying for admission into the program must have completed 1-year of calculus, 1-year of physics, 1-year of general/inorganic chemistry, 1-year of organic chemistry, 1-year of physical chemistry, 1-course in computers, and additional coursework in chemistry/biochemistry.

The graduate coordinator carefully reviews all student applications and transcripts. Applicants not meeting the above criteria are not admitted into the program. Specific recommendations to remove academic deficiencies (or to improve GPA) are stated to applicants who are denied admission into the program.

**ASSESSMENT GOAL NO. 2:****ALL NEW ENTERING CHEMISTRY GRADUATE STUDENTS ARE TO BE FULLY INFORMED OF DEPARTMENT AND UNIVERSITY REQUIREMENTS AND REGULATIONS**

A detailed (10-page) letter is sent by the Graduate Coordinator to **all** newly-admitted chemistry graduate students as part of initial correspondence. This letter enumerates various Department and University requirements and regulations. The letter directs students to carefully read the University catalog for more detailed information. Chemistry placement exam requirements, the University Writing Skills Test (WST) requirement, requirements for Advancement to Candidacy, Masters Degree completion, 5-year rule, academic dishonesty/plagiarism issues, academic probation/disqualification and selection of a faculty thesis adviser are some of the issues addressed in this letter.

**ASSESSMENT GOAL NO. 3:****NEWLY-ADMITTED CHEMISTRY GRADUATE STUDENTS SHOULD BE PREPARED AND READY TO STUDY CHEMISTRY AT THE GRADUATE LEVEL**

ALL newly-admitted chemistry graduate students are expected to take a chemistry placement exam (within the 1st/2nd quarter of their initial admission into the program). This exam covers general/inorganic chemistry, organic chemistry, physical chemistry, and biochemistry. It is administered on a monthly basis by the graduate coordinator. Students failing the exam (or a portion of the exam) must complete specific undergraduate chemistry coursework by completing either organic chemistry, physical chemistry, or biochemistry courses (and passing coursework with a grade of B or higher). Entering students have the option to take refresher coursework in the above areas of chemistry (passing this coursework with a grade of B or higher) and substituting this coursework in lieu of taking the chemistry placement exam. Students are also informed of the need to complete/pass the University Writing Skills Test (WST). The Graduate Coordinator "tracks" chemistry placement exam results/course substitutions and WST results.

**ASSESSMENT GOAL NO. 4:****CHEMISTRY GRADUATE STUDENTS SHOULD BE PRESENTED WITH A BODY OF ADVANCED CORE CHEMICAL INFORMATION**

Depending upon the Degree Plan/Option, chemistry graduate students must complete coursework in thermodynamics, the chemical bond, and/or biochemistry. For Plan A/Plan B Programs assessment of Chemistry 6521 -The Chemical bond will be conducted. Chemistry graduate students completing this course should have a solid understanding of the quantum mechanical description of the atom and of chemical bonding in molecules. Embedded exam questions will be utilized and analyzed. Criterion: a score of 75% or higher by 90% of the students will be considered satisfactory performance.

For Plan A (Biochemistry Option), Chemistry 6430 -Protein Chemistry Techniques will be assessed. Chemistry graduate students should have a solid background in protein laboratory methods necessary to isolate, purify, and analyze proteins. Embedded exam questions will be utilized and analyzed. Criterion: a score of 75% or higher by 90% of the students will be considered a satisfactory performance.

**ASSESSMENT GOAL NO. 5: CHEMISTRY GRADUATE STUDENTS SHOULD BE PRESENTED WITH NEW DEVELOPMENTS IN THE CHEMICAL/BIOCHEMICAL SCIENCES**

Depending on the Program/Option, all chemistry graduate students must complete 9-12 units of Advanced Topic courses in the areas of organic chemistry, physical chemistry and biochemistry. These topical courses present new, "cutting-edge" chemical and biochemical information. Chemistry 6310, Chemistry 6410, and Chemistry 6510 are Advanced Topics courses offered by the Department.

**ASSESSMENT GOAL NO. 6: CHEMISTRY GRADUATE STUDENTS SHOULD HAVE SOLID EXPERIENCE WITH LABORATORY RESEARCH METHODS**

All three Chemistry Plans/Options have extremely strong laboratory research course requirements. Therefore, depending on the Plan/Option, students must complete Chemistry 6830 (Research, 3-6 units), Chemistry 6850 (Methods of Graduate Research, 3 units), Chemistry 6900 (Independent Study/Research), Chemistry 6910 (University Thesis, 3 units), Chemistry 6430 (Protein Chemistry Techniques, 4 units), and Chemistry 4521 (Instrumental Methods of Analysis, 4 units). In addition, many chemistry graduate students complete Chemistry 4430 (General Biochemistry Laboratory, 4 units) and Chemistry 4431 (Advanced Biochemistry Laboratory, 2 units) and often, complete Advanced Biology laboratory courses.

The assessment methods and criteria for Plan A students will be discussed under Assessment Goal NO. 9. For Plan B students, CHEMISTRY 4240 -Instrumental Methods of Analysis will be assessed. Embedded exam questions will be assessed and analyzed. Criterion: a score of 75% or higher for 90% of students will be considered to be satisfactory performance. The course instructor will also assess laboratory skills and laboratory reports and/or notebook.

**ASSESSMENT GOAL NO. 7: CHEMISTRY GRADUATE STUDENTS SHOULD BE ABLE TO PRESENT COMPLEX CHEMICAL INFORMATION VIA ORAL SEMINAR PRESENTATIONS**

All chemistry graduate students must complete three separate Chemistry Seminar courses (Chemistry 6820, 1 unit). Students are expected to select a topic in chemistry or biochemistry, search the literature, develop a 30-min. oral seminar presentation-using transparencies or computer powerpoint presentation, and answer questions. The seminar is presented to fellow students and to the faculty. Assessment method and Criterion: the faculty member coordinating the Chemistry Seminar will utilize a "Seminar-scoring Sheet" and will evaluate each student seminar with respect to scientific content, oral presentation/speaking, proper use of visual-aids, and ability to answer questions about the topic. A score of 75% or higher by 90% of the students will be considered satisfactory performance.

**ASSESSMENT GOAL NO. 8 :                   CHEMISTRY GRADUATE STUDENTS SHOULD BE ABLE TO  
PRESENT COMPLEX CHEMICAL INFORMATION VIA  
WRITTEN PRESENTATIONS**

Depending on the Plan/Option, all chemistry graduate students must complete coursework requiring written reports. Chemistry 6830, Chemistry 6850, Chemistry 6901, and Chemistry 6910 are courses requiring formal written reports. In addition, Chemistry 4521 and Chemistry 6430 require written laboratory report or laboratory notebook. In addition Chemistry 4700 (Survey of Chemical Literature, 2 units) is required for the Plan B Option and is highly recommended for Plan A students. Library and laboratory research reports are carefully reviewed and edited by the supervising faculty adviser. A final draft, is usually reviewed by a three-person faculty committee (including the primary faculty adviser). The assessment method and criteria for written reports will be discussed under Assessment Goal No. 9.

**ASSESSMENT GOAL NO. 9 :                   CHEMISTRY GRADUATE STUDENTS SHOULD BE ABLE TO  
SUCCESSFULLY COMPLETE A "CAPSTONE" PROJECT**

**Plan A - UNIVERSITY THESIS  
Plan B - COMPREHENSIVE EXAMINATION**

Plan A Chemistry graduate students are expected to submit a completed, well-written University Thesis. The thesis should conform to Department and University guidelines and should document the research topic, background information, research methods, research data/results, conclusions, and references. Assessment method and Criteria: the thesis is to be carefully read and reviewed by the supervising faculty adviser. Additional drafts are to be written and edited by the student. A final draft will be read and reviewed by a three-person thesis committee (including the primary faculty adviser). The signed/dated Signature Page of the thesis will be considered as the primary assessment criterion, signifying satisfactory performance.

Plan B Chemistry graduate students are expected to complete Chemistry 6901 - Comprehensive Examination (2 units) as the "Capstone" project for the Masters Degree. This includes completion of a 20+page Review Paper, an oral exam over the review paper, and passing a comprehensive written exam over chemistry and/or biochemistry. The review paper is read/reviewed by a three-person committee (this committee also sits on the oral examination). The successful completion of the review paper, passing of the oral exam, and passing the comprehensive written exam will be considered satisfactory assessment performance.

**ASSESSMENT GOAL NO.10:**

**CHEMISTRY GRADUATE STUDENTS SHOULD BE ABLE  
TO PURSUE/SECURE A CAREER IN CHEMISTRY**

A simple (optional) survey will be administered by the Graduate Coordinator to graduating chemistry students. This survey will ask about present or planned employment in chemistry /biochemistry /biotechnology. It will also ask about present or anticipated additional graduate work in chemistry/biochemistry (Ph.D.-level) and about pursuit of additional pre-professional education (medicine, dentistry, pharmacy etc.). The results will be tallied by the Graduate Coordinator.