Student Learning Outcomes/Objectives, with Any Associations and Related Measures, Targets, Findings, and Action Plans

**SLO 1: Advanced understanding of concepts in area of specialty**
Graduate students will acquire an advanced understanding of concepts in areas related to their thesis research and area of specialty and will be capable of 1) applying these concepts, 2) analyzing new topics or material, 3) composing or constructing new ideas, and 4) appraising and evaluating his/her own work and the work of others.

**Related Measures**

**M 1: Research project**
All graduate students in the chemistry Ph.D. program will complete a research project, requiring the collection and interpretation of data. This effort will result in the construction of a thesis, which will be orally defended in front of the thesis committee and the public.

Source of Evidence: Senior thesis or culminating major project

**Target:**
75% of students will receive an average score of 3.5 out of 5 on the seven criteria included in the rubric based on jury judging by the dissertation committee (appointed by the graduate school). The committee will evaluate if the work is scientifically sound, noteworthy, and presented well in oral and written format. The committee will also assess the student's ability to apply, analyze, compose, and appraise in the context of his/her research field.

**M 2: Abstract**
Each student in the Ph.D. program will achieve sufficient research competency to allow presentation of research results at a regional, national, or international conference in chemistry and publication in a peer reviewed journal.

Source of Evidence: Academic indirect indicator of learning - other

**Target:**
75% of students will have sufficient research results, understanding of their work, and oral and written competency to present the results at a professional meeting or publish the results in a peer reviewed journal. The quality of research work and level of understanding will be jury judged based on the dissertation defense utilizing the relevant items from the evaluation rubric. A score of 3.5 out of 5 on the relevant rubric items will signify competence.

**M 3: Cumulative examinations**
Graduate students will demonstrate competence in their discipline via cumulative examinations.

Source of Evidence: Comprehensive/end-of-program subject matter exam

**Target:**
80% of students will pass three cumulative exams out of 9 attempts. Cumulative exam performance will be based on faculty committee evaluation. Maintain target for Spring 2014 to determine if the target will be consistently exceeded. If it is also exceeded in Spring 2014, then it may be appropriate to increase the target.

**M 4: General Examination**
Graduate students will demonstrate oral and written technical competence in their discipline via the general exam.

Source of Evidence: Academic direct measure of learning - other

**Target:**
On the general exam, 75% of students will receive an average score of 3.5 out of 5 on the seven criteria included in the rubric based on jury judging by the thesis committee (appointed by the graduate school). The committee will evaluate if the work is scientifically sound, noteworthy, and presented well in oral and written format.

**SLO 2: Advanced understanding of concepts in physical chemistry and 2 subdisciplines**
Graduate students will acquire an advanced understanding of concepts in physical chemistry and a minimum of 2 subdisciplines outside of physical chemistry (Analytical, Biochemistry, Inorganic, Organic, Materials, Medicinal) through completion of graduate level coursework. An advanced understanding includes the ability to apply knowledge and analyze information.

**Related Measures**

**M 5: Physical chemistry course final exam**
Asses performance in graduate level physical chemistry course using final exam

Source of Evidence: Academic direct measure of learning - other

**Target:**
75% of M.S. students will score 70% or higher on the final exam in a required graduate level physical chemistry course (ChE 5310 or 5311).

**M 6: Assess courses using final exam**
Asses courses taken and ensure successful completion using final exam

Source of Evidence: Academic indirect indicator of learning - other

**Target:**
75% of M.S. students will score 70% or higher on final exams in required graduate level coursework.

**SLO 3: Competent instructors**
Graduate students will develop skills to be competent instructors of undergraduate students.
**Related Measures**

**M 7: Teacher assistant**
Graduate students will serve as effective TAs for undergraduate courses.

Source of Evidence: Academic indirect indicator of learning - other

**Target:**
80% of the undergraduate students will achieve a C or better in their lab courses taught by TAs.

**M 8: Evaluations of TAs**
Student evaluations of teaching assistants in general chemistry and organic chemistry labs.

Source of Evidence: Student course evaluations on learning gains made

**Target:**
Graduate students serving as TAs will receive positive ratings from 80% or higher of the students whom they have instructed.

**SLO 4: Chemical literature**
Graduate students will be able to explain in technical written and oral formats an advanced understanding of a current topic in the chemical literature.

**Related Measures**

**M 9: Graduate Seminar course**
All graduate students will complete oral and written assignments in the required Graduate Seminar course.

Source of Evidence: Academic direct measure of learning - other

**Target:**
75% of Ph.D. students will achieve an average score of 3.5 out of 5 or higher across the 4 criteria in the rubric for oral performance and for written performance. Students will be assessed by a jury of faculty members.