

## GPNS Chemistry-MS Assessment Plan

**Outcome #1:** Chemistry-MS students will be able to evaluate the scientific literature and to use it in their courses and research.

**Strategy:** The Chemistry-MS degree requires that students enroll in a CHEM 510 (Foundations in graduate studies), which as part of the course curriculum includes direct instruction and practice in achieving this goal. Further experience will be gained by using these techniques in several other graduate courses including CHEM 593 (Seminar), CHEM 588 (Internship Seminar), and CHEM 589 (Thesis Defense Seminar) as well as in other disciplinary based courses in Chemistry as determined by the instructors in those courses. Finally, students will rely upon this skill in authoring their thesis or internship report.

**Assessment Method(s):** Students will exhibit a satisfactory grasp of the principles of literature searching and evaluation, in a wide variety of media, and this will be evident in their oral and written work as determined by cognizant faculty evaluating CHEM 593 (Seminar), CHEM 588 (Internship Seminar), and CHEM 589 (Thesis Defense Seminar). Furthermore, routine evaluation of student's progress at meeting this outcome will occur by at Thesis Committee or Internship Committee Meetings each semester.

**Criterion:** A team of faculty who are present at the student's seminars will evaluate progress in this area by completing a written evaluation form in CHEM 593 (Seminar). Similarly, teams of faculty (Committee members and Chemistry-MS Director) will evaluate student presentations at the thesis and internship defenses as well as their written reports (thesis and internship reports, CHEM 589 and CHEM 588). All students will perform satisfactorily or they will be required to repeat the effort and/or make appropriate modifications.

**Outcome #2:** Chemistry-MS students will be able to effectively communicate scientific research, both their own and information from the research literature, in written and oral fashions.

**Strategy:** Students will begin developing the skills necessary to meet this outcome in CHEM 510 (Foundations in graduate studies), which will include evaluation and discussion of research topics presented in the contemporary peer reviewed scientific literature. Further development of these skills will occur individually by the student working with their thesis/internship advisor. All students in the program will enroll in CHEM 593 (Seminar) and in either CHEM 589 (Thesis Defense Seminar) or CHEM 588 (Internship Seminar). In all of these courses both written and oral presentations are required. Additionally, development of these skills will occur in both core and elective courses at the discretion of the individual instructors.

**Assessment Method(s):** Students will satisfactorily complete seminar requirements, involving both oral and written presentations. The oral presentations will be made before an audience of students (graduate and undergraduate), faculty and the public is also invited. Faculty will participate in the formal evaluation process by means of an evaluation form for CHEM 593; attending students will also be encouraged to participate in the process for both their benefit and that of the student presenter. In CHEM 589 or 588, the evaluation will be formally conducted by the student's Thesis or Internship Committee and the Director of the Chemistry-MS program, but the presentation will be open to the public.

**Criterion:** A team of faculty who are present at the seminars will evaluate the students by completing a written evaluation form in CHEM 593 (Seminar). Similarly teams of faculty (Committee members and Chemistry-MS Director) will evaluate the student during their thesis and internship defense presentations as well as their written reports (thesis and internship reports, CHEM 589 and CHEM 588). All students will perform satisfactorily or they will be required to repeat the effort and/or make appropriate modifications. Students will be given feedback on their performance (critiques).

**Outcome #3:** Chemistry-MS students will develop and master the scientific problem solving skills required to define and solve basic or applied original scientific questions using the scientific method.

**Strategy:** Faculty mentors and committee members, as well as other faculty members, will work to assist the students in designing strategies and experiments to answer basic or applied scientific questions. Chemistry-MS students will initial work on developing these skills in CHEM 510 through the practical discussion of the scientific method and analysis of published scientific research. Furthermore, Chemistry-MS students will put these skills to practice in developing their Thesis or Internship Plan, which is a requirement of CHEM 510 and must be approved by the student's thesis or internship committee. These skills will be further honed through faculty mentoring in the completion of thesis or internship research (CHEM 599 and CHEM 598) and guidance provided during routine committee meetings. In addition, the completion of advanced coursework within a student's field of study will facilitate the development of their scientific knowledge that will be required to design meaningful experiments and interpreting the results of experimentation in the pursuit of solving scientific questions.

**Assessment Method(s):** Assessment and documentation of the progress in developing and applying scientific problem solving skills will be made by cognizant faculty members at each committee meeting, development and approval of the thesis or internship plan, during completion of advanced course work. Ultimately the ability to practically use the scientific method will be assessed in the completion and defense of a thesis or internship.

**Criterion:** Successful completion and defense of a research thesis or internship will serve as evidence of the student's mastery and use of the scientific method.

**Outcome #4:** Chemistry-MS students will actively engage in collaborative research/internships and discourse with the faculty in the Chemistry Department and other STEM disciplines.

**Strategy:** Faculty will act as mentors and advisors, directing thesis research or internships and in serving on thesis and internship committees. The average number of Chemistry-MS or other GPNS students mentored per year will be one to three per faculty member.

**Assessment Method(s):** Records will be kept by the Chemistry-MS Director on the activities of faculty engaged with students in roles as research advisors and as Chemistry-MS or other GPNS committee members (research or internships).

**Criterion:** At least 75% of the faculty in the Chemistry departments, based on a three year rolling average, will be engaged with at least one student's Chemistry-MS or other GPNS Committee as either the Research Advisor or Committee Member.

**Outcome #5:** Chemistry-MS students and faculty will disseminate the products of the Chemistry-MS program within CSU-Pueblo community and with communities outside of the university in activities using their professional expertise.

**Strategy:** Students and faculty will collaborate and act as participants and contributors, as appropriate, to area, regional, and national scientific organizations (public and private) in the discussion and dissemination of scientific information. For example students and faculty might give presentations to organizations within the greater Southern Colorado region, give seminars/posters on campus or at appropriate scientific meetings, publish the results of their research in peer reviewed scientific journals, or disseminate information through other appropriate mediums.

**Assessment Method(s):** A survey of current activities will be taken and efforts will be made to encourage students and faculty to increase these activities as time and resources permit.

**Criterion:** At least 50% of the Chemistry-MS students and faculty, based on a 3 year rolling average, will be engaged in these professional outreach activities, broadly defined, - including giving research/recruiting seminars at universities or industry, research presentations at local, regional, and national conferences, etc.