

STUDENT LEARNING ASSESSMENT PROGRAM SUMMARY FORM

Program Name: **M.S. in Chemistry**
 Dept: **Chemistry and Biochemistry**
 College: **CLAS**
 Submitted by: **Radu F. Semeniuc**

Part 1:

CGS Learning Goal # 1: A depth of content knowledge.	Program Learning Goal(s): Students will learn fundamental principles at an advanced level in selected areas in chemistry.
How are learners assessed?	a) Students' overall GPA. b) Department of Chemistry Evaluation of Student Performance on the M.S. Comprehensive Exam. c) literature seminar given in CHM 5001.
What are the expectations for the students?	a) 100% of students graduate with a GPA \geq 3.5. b) 100% of students with scores \geq 3 (4-point scale) on knowledge item. c) 100% of students with average rating for chemistry content items on evaluation instrument \geq 2 (3-point scale).
What are the expectations for the program?	a) 100% of students graduate with a GPA \geq 3.5. b) 100% of students with scores \geq 3 (4-point scale) on knowledge item. c) 100% of students with average rating for chemistry content items on evaluation instrument \geq 2 (3-point scale).
What were the results?	a) FA21-SP22: 3 students graduated with a GPA \geq 3.5; 100%. FA22-SP23: 3 students graduated with a GPA \geq 3.5; 100%. b) 2 students in AY 21-22; 100%. 1 student in AY 22-23; 100%. c) 3 students in AY 21-22; 100%. 3 students in AY 22-23; 100%.
How are the results shared? How will these results be used?	a) Graduate Committee. b) Student's thesis committee, research advisor and Graduate Coordinator. c) course instructors, department faculty. Department Chair and Graduate Committee discuss results, then share with CHM Faculty.

CGS Learning Goal # 2: Critical thinking and problem-solving skills.	Program Learning Goal(s): Students will be able to critically analyze a breadth of chemical problems & experimental results.
How are learners assessed?	<ul style="list-style-type: none"> a) Department of Chemistry Evaluation of Student Performance on the M.S. Comprehensive Exam. b) Department of Chemistry Evaluation of Student Performance on the M.S. Thesis. c) CHM 5003: written critique of a published paper. d) CHM 5180: open ended lab assignment in which students develop two analytical methods for quantifying a chemical substance and compare these methods. e) CHM 5420: 'chalk-talk' based on a topic in a current organic chemistry journal article. f) CHM 5360: completed homework assignments, or presentation of a research paper on supramolecular chemistry. g) CHM 5210: completed homework assignments, research paper, or presentation of research paper.
What are the expectations for the students?	<ul style="list-style-type: none"> a) 100% of students with scores ≥ 3 (competent, 4-point scale) on "critically analyze" item. b) 100 % of students with scores ≥ 3 (competent, 4-point scale) on "critically analyze" item. c) 100% of students successfully complete this activity. d-g) 50% of students earn a grade of 90% or higher on corresponding activity.
What are the expectations for the program?	<ul style="list-style-type: none"> a) 100% of students with scores ≥ 3 (4-point scale) on "critically analyze" item. b) 100 % of students with scores ≥ 3 (4-point scale) on "critically analyze" item. c) 100% of students successfully complete this activity. d-g) 50% of students earn a grade of 90% or higher on corresponding activity.
What were the results?	<ul style="list-style-type: none"> a) FA21-SP22: 3 students in AY 20-21; 100%. FA22-SP23: 3 students in AY 20-21; 100%. b) FA21-SP22: 3 students in AY 20-21; 100%. FA22-SP23: 3 students in AY 20-21; 100%. c) FA21-SP22: 3 students in AY 20-21; 100%. FA22-SP23: no students enrolled. d) FA21-SP22: CHM 5180: 5 students in total; 3 students > 90%; 60%. FA22-SP23: CHM 5180 was not offered during this AY. e) FA21-SP22: CHM 5420: 3 students in total; 1 student > 90%; 33%. FA22-SP23: CHM 5420 was not offered during this AY. f) FA21-SP22: CHM 5360 was not offered during this AY. FA22-SP23: 4 students in total; 4 students > 90%; 100%.

	g) FA21-SP22: CHM 5210 was not offered during this AY. FA22-SP23: CHM 5210: 1 student total; 0 students > 90%; 0%.
How are the results shared? How will these results be used?	a) Student's thesis committee, research advisor, and Graduate Coordinator. b) Student's research advisor and thesis committee Graduate Coordinator. c-g) course instructors. Department Chair and Graduate Committee discuss results, then share with CHM Faculty.

CGS Learning Goal # 3: Effective oral and written communication skills.	Program Learning Goal(s): Students will be able to communicate scientific material effectively in speaking and writing.
How are learners assessed?	a) CHM 5001: overall seminar evaluation. b) Department of Chemistry Evaluation of Student Performance on the M.S. Comprehensive Exam. c) Department of Chemistry Evaluation of Student Performance on the M.S. Thesis. d) Student research presentations at conferences.
What are the expectations for the students?	a) 100% of students with an overall rating ≥ 2 (3-point scale) for presentation items. b) 100% of students with scores ≥ 3 (4-point scale) on the communication item. c) 100% of students with scores ≥ 3 (4-point scale) on communication item. d) 75% or more of students give a conference presentation by graduation.
What are the expectations for the program?	a) 100% of students with an overall rating ≥ 2 (3-point scale) for presentation items. b) 100% of students with scores ≥ 3 (4-point scale) on the communication item. c) 100% of students with scores ≥ 3 (4-point scale) on the communication item. d) 75% or more of students give a conference presentation by graduation.
What were the results?	a) FA21: 1 student with overall rating ≥ 2 (3-point scale); 100%. SP22: 1 student with overall rating ≥ 2 (3-point scale); 100%. FA22: 3 students with overall rating ≥ 2 (3-point scale); 100%. SP23: 2 students with overall rating ≥ 2 (3-point scale); 100%. b) FA21-SP22: 3 students in AY 20-21; 100%. FA22-SP23: 3 students in AY 20-21; 100%. c) FA21-SP22: 3 students in AY 20-21; 100%. FA22-SP23: 3 students in AY 20-21; 100%. d) FA21-SP22: (3 students in AY 20-21; 100%. FA22-SP23: (3 students in AY 20-21; 100%.

How are the results shared? How will these results be used?	<ul style="list-style-type: none"> a) Course instructors, department faculty. b) department faculty. c) Student's thesis committee, research advisor and Graduate Coordinator. d) student's thesis advisor, Graduate Coordinator. <p>Department Chair and Graduate Committee discuss results, then share with CHM Faculty.</p>
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CGS Learning Goal # 4: Evidence of advanced scholarship through research and/or creative activity.	Program Learning Goal(s): Students will be able to conduct original research and properly utilize chemical information and database sources.
How are learners assessed?	<ul style="list-style-type: none"> a) Department of Chemistry Evaluation Student Performance on the M.S. Comprehensive Exam. b) Department of Chemistry Evaluation of Student Performance on the M.S. Thesis. c) CHM 5001 seminar evaluation. d) Department of Chemistry Evaluation of Student Performance on the M.S. Thesis. e) Assignment in CHM 5002 (use of electronic databases to find relevant chemical information).
What are the expectations for the students?	<ul style="list-style-type: none"> a) 100% of students with scores ≥ 3 (4-point scale) on the independent research item. b) 100% of students with scores ≥ 3 (4-point scale) on the independent research item. c) 100% of students with scores ≥ 2 (3-point scale) on the literature item. d) 100% of students with scores ≥ 3 (4-point scale) on chemical information item. e) 100% of students successfully complete assignment.
What are the expectations for the program?	<ul style="list-style-type: none"> a) 100% of students with scores ≥ 3 (4-point scale) on the independent research item. b) 100% of students with scores ≥ 3 (4-point scale) on the independent research item. c) 100% of students with scores ≥ 2 (3-point scale) on the literature item. d) 100% of students with scores ≥ 3 (4-point scale) on chemical information item. e) 100% of students successfully complete assignment.
What were the results?	<ul style="list-style-type: none"> a) FA21-SP22: 3 students in AY 20-21 with scores ≥ 3; 100%. FA22-SP23: 3 students in AY 20-21 with scores ≥ 3; 100%. b) FA21-SP22: 3 students in AY 20-21 with scores ≥ 3; 100%. FA22-SP23: 3 students in AY 20-21 with scores ≥ 3; 100%. c) FA21-SP22: 3 students in AY 20-21 with scores ≥ 2; 100%. FA22-SP23: 2 students in AY 20-21 with scores ≥ 2; 67%. d) FA21-SP22: 3 students in AY 20-21 with scores ≥ 3; 100%. FA22-SP23: 3 students in AY 20-21 with scores ≥ 3; 100%.

	e) FA21-SP22: 3 students in AY 20-21; 100%. FA22-SP23: no students
How are the results shared? How will these results be used?	a) Student's research advisor and thesis committee. b) Student's thesis committee. c) Course instructors, department faculty. d) Student's research advisor and thesis committee. e) Course instructors. Department Chair and Graduate Committee discuss results, then share with CHM Faculty.

CGS Learning Goal # 5: Ethics and Professional Responsibility.	Program Learning Goal(s): The graduate students demonstrate an understanding for and follow the professional ethics guidelines established for the chemistry field.
How are learners assessed?	a) Complete CITI training and earn the Responsible Conduct of Research certificate. b) Ethical issues discussions and case analyses in CHM 5002 and/or CHM 5003.
What are the expectations for the students?	a) Students are expected to earn the CITI Responsible Conduct of Research certificate. b) Students are expected to analyze several cases of unethical behavior in chemical science.
What are the expectations for the program?	a) 100% of students earn the CITI Responsible Conduct of Research certificate. b) 100% of students participate in class discussions.
What were the results?	a) FA21-SP22: 2 students earned the certificate; 100%. FA22-SP23: no students needing to earn the CITI certificate. b) FA21-SP22: 3 students participated in CHM 5002 and/or CHM 5003 discussions and assignments; 100%. FA22-SP23: no students enrolled in 5002 / 5003
How are the results shared? How will these results be used?	Department Chair, Graduate Committee and instructors discuss results, then share and discuss with CHM Faculty.

Part 2: Describe what your program's assessment accomplishments since your last report was submitted. Discuss ways in which you have responded to the Graduate Assessment Summary Response from last year's report or simply describe what assessment work was initiated, continued, or completed.

During the combined academic years FA 2021-SP 2022 and FA 2022-SP 2023 our MS program was populated with a total of 9 students. Six of them are either continuing their education at Ph.D. granting universities or they have found jobs in industry. The remaining three students are continuing their education in our department, and they will graduate in FA 2024. Based on the quantitative data listed in PART ONE, we have either met or exceeded our learning objectives and goals, with only a few exceptions, commented upon below.

G#2_d, e, and g, and G#4_c: some students didn't perform as expected in our graduate level classes. We will discuss ways to improve their performance within our Graduate Committee, together with the Department Chair, then discuss it at large in a faculty meeting, where all graduate faculty will be present.

Compared to the last report period, we have made improvements in collecting the evaluation forms (Student Performance on the M.S. Comprehensive Exam and Student Performance on the M.S. Thesis) from the thesis research advisors and the thesis committee members (these are important tools in assessing the quality of our program). In the past we had difficulties in collecting these forms from all the members of the thesis committee, and now we are close to a 100 % success rate.

Part 3: Summarize changes and improvements in curriculum, instruction, and learning that have resulted from the implementation of your assessment program. How have you used the data? What have you learned? In light of what you have learned through your assessment efforts this year and in past years, what are your plans for the future?

We are constantly analyzing our graduate program to find ways of its improvement. Good feedback from our students is critical to achieve this task. Therefore, we have asked our students to complete an exit interview. The exit interview is voluntarily, and items in the survey include (among others) the distribution of courses over the two years, course sequence, how the research work contributed to their professional growth, and the value of the seminar and elective courses. Most of our students completed the interview and the results showed that our program suits their needs they were looking for to further their future careers.

We are also analyzing if some changes in in the course offering sequence (*i.e.*, switching CHM 5420 – offered in fall semesters odd years with CHM 5360 – offered in spring semesters odd years, or switching CHM 5360 with CHM 5180 – offered in spring semesters even years) would be beneficial to our program. Such a change would help some incoming students to better adjust to our graduate program, if there is a need for them to take some undergraduate classes before enrolling in our graduate lectures.

We are looking into the possibility to start an “online submission” of several forms, like submitting the students exit interviews, or the evaluation of student performance on the M.S. Comprehensive Exam and student performance on the M.S. Thesis, in an attempt to increase the collection of these documents to a 100 % rate.

We also plan to continuously strengthen our program by closely following the Academic Professional Guidelines put forth by the American Chemical Society (ACS) (see the full document at https://www.acs.org/careers/career-services/ethics/academic-professional-guidelines.html#articleContent_columnsbootstrap). Our faculty strives to maintain high standards of honesty, integrity, ethics, and diligence in the conduct of teaching and research, as well as to increase the academic and research progress of our students.