

## Annual Assessment Report

### M.S. in Chemistry AY 21-22

#### ***Program Information:***

*Name of Program:* M.S. in Chemistry

*Degree Type:* Graduate

*Coordinating Faculty:* Herman Nikolayevskiy (hnikolayevskiy@usfca.edu), Chemistry Graduate Program Director

*Mission Statement: (No changes)*

To deliver a broad-based, challenging research experience that will train students to participate effectively as PhD researchers, health professionals, government and industry professionals, or as teachers. The program will foster a culture that: values strong researcher-faculty-staff interactions and strives to help researchers become self-learners and to discover the excitement and creativity of chemical research. We strive to instill values of social responsibility with ethical behavior as part of a chemical research community culminating in the writing of a research thesis.

#### *Program Learning Outcomes:*

1. Students demonstrate a broad knowledge in areas of chemistry relevant to their research interests.
2. Students will become safe and proficient in laboratory practice and instrumental techniques necessary for their research area.
3. Students will be able to communicate the subject of chemistry, especially their own research project, in written and oral forms including: correspondence, reports and short presentations that may utilize multimedia tools that support effective communication
4. Students will become critical thinkers who are able to judge scientific arguments and make their own arguments based on experiments conducted during their research project
5. Students who graduate with an MS degree in chemistry from USF will be well prepared to pursue further graduate studies or employment in chemistry or related scientific fields.

#### *Program Learning Goals:*

1. Students will demonstrate competency in two subdisciplines of chemistry relevant to their research goals.
2. Students will acquire and analyze data demonstrating safe, proficient laboratory practice / instrumental techniques, and analyze that data as necessary for their research area
3. Students will be able to communicate their own research project, in written and oral forms.

4. Students will guide undergraduates in laboratory work.

*Curricular Map: (No Changes)*

MS CHEMISTRY	PLG1	PLG2	PLG3	PLG4
Program Learning Goals X Courses	Students will demonstrate competency in two subdisciplines of chemistry relevant to their research goals.	Students will acquire and analyze data demonstrating safe, proficient laboratory practice / instrumental techniques, and analyze that data as necessary for their research area.	Students will be able to communicate their own research project, in written and oral forms.	Students will guide undergraduates in laboratory work
<b>Courses of Program Requirement</b>				
Entrance Examinations	I, D, M			
Opt 1: Diagnostic Test	x			
Opt 2: Independent Study	x			
Opt 3: Undergraduate Coursework	x			
CHEM 698 Graduate Research Methods		I, D, M	I, D	I, D, M
CLO1		x		
CLO2			x	
CHEM 699: Thesis Writing			M	
CLO1			x	
CLO2			x	
Teaching Assistantship				I, D, M
		Key:		
		I = Introductory		
		D = Developing		
		M = Mastery		

*Assessment Schedule:*

F21 – PLO1

**F22 – PLO3 (current)**

F23 – PLO2

F24 – PLO4

F25 – PLO5

**Program Assessment:**

*Assessment Methodology:*

Every year, our graduate students present their research in poster format at the on-campus CARD event. During the Spring 2022 CARD event, several faculty members volunteered to assess the students' scientific communication skills (PLO 3) using a common rubric (see attached). Of the 11 graduate students presenting, 10 were assessed by 1–3 faculty members. The students were a mix of 1<sup>st</sup> and second year graduate students. The 11<sup>th</sup> student who was not assessed had just started the program in Spring 2022. The benchmark for proficiency in each of the categories was considered 4/5.

Prior to their Spring 2022 CARD presentation, each student submitted a sample poster in CHEM 698, practiced their poster in front of their CHEM 698 classmates, and received feedback from both their peers and the CHEM 698 instructor. Research directors were involved in both content and planning.

## Results:

	Rubric Category									10 - Overall Impression
	1	2	3	4	5	6	7	8	9	
Student 1 Average	4.5	5.0	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.5
Student 2 Average	4.0	4.5	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
Student 3 Average	5.0	4.7	5.0	5.0	4.3	4.0	4.0	4.0	4.7	4.3
Student 4 Average	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0	5.0	5.0
Student 5 Average	4.5	4.5	4.5	3.5	4.5	4.5	3.0	4.0	4.5	4.0
Student 6 Average	4.0	4.5	4.0	4.0	5.0	4.5	4.0	4.5	4.5	4.0
Student 7 Average	4.0	4.0	5.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
Student 8 Average	5.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0	4.0
Student 9 Average	4.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Student 10 Average	5.0	5.0	5.0	5.0	5.0	4.0	5.0	2.0	5.0	4.0
Overall Student Average	4.5	4.5	4.6	4.3	4.4	4.3	3.7	3.9	4.4	4.2

As can be seen in the table above, our students demonstrated proficiency in all but two of the rubric categories. Category 7 – *the ability to properly use literature in a presentation* – and category 8 – *the ability to support generalizations and conclusions with adequate and sound evidence* – were both slightly below the 4/5 benchmark. This PLO was previously assessed in 2019 (towards the end of our previous assessment cycle) using the same rubric. With the caveat that only 4 students were assessed in 2019, the average scores for category 7 and 8 were 4.0 and 4.4 respectively.

The AY 21-22 scores indicate that our graduate students did a good job overall of presenting their research at CARD. The students had relatively high averages in most rubric categories, and these scores were more or less comparable with scores received during the 2019 assessment of this PLO.

### *Closing the loop:*

To improve on the proficiency of rubric categories 7 and 8 in particular, the results of this assessment will be discussed at department meeting. I will recommend to research directors and future CHEM 698 instructors that formative feedback specifically concerning these two areas be given during practice presentations, allowing students adequate time to improve their presentation prior to CARD. Additionally, I will recommend to future CHEM 698 instructors that

one class period be dedicated to analyzing how generalizations and claims in the primary literature are supported by specific pieces of evidence.

*Feedback to the Previous Year's Report:*

Prof. Lendvay's feedback to the previous year's report was circulated at department meeting and further discussed amongst the research directors. Prof. Lendvay made several great points, noting that the assessment of PLO 1 using ACS subject exams prior to the start of the MS program is not a good way to assess a PLO of the program itself. Prof. Lendvay suggested that the exam be taken a second time closer to graduation, to assess changes in student knowledge as a result of the program. The research directors wholeheartedly agree with this recommendation, and are currently in the process of discussing revisions to the MS program. One area of discussion concerns the number of ACS exams to have students take, and when to have students take them.

**Department of Chemistry, USF**  
**CARD Poster or Presentation Assessment, Spring 2022 (return to Herman N.)**

Course: Chem 698 Research Methods Student: \_\_\_\_\_

Evaluator \_\_\_\_\_

**Key**

**1: Strongly Disagree**

**2: Disagree**

**3: Neither Agree or disagree**

**4: Agree**

**5: Strongly Agree**

**Overall the student's work shows that the student...:**

1. demonstrates understanding of the problem and how problem was attacked and solved.

1      2      3      4      5

2. demonstrates effective organization of their project, poster, seminar.

1      2      3      4      5

3. demonstrates effective use of graphs and other visual aids.

1      2      3      4      5

4. uses effective writing and appropriate technical vocabulary (good grammar, spelling, coherent writing, clear exposition)

1      2      3      4      5

5. shows an ability to use instrumentation useful in solving the problem.

1      2      3      4      5

6. collected reasonable data useful in solving the problem.

1      2      3      4      5

7. uses literature properly in presentation.

1      2      3      4      5

8. supports their generalizations and conclusions with adequate and sound evidence.

1      2      3      4      5

9. demonstrates effective learning of several laboratory skills.

1      2      3      4      5

10. Overall impression of the project, poster, presentation, etc. Please rate your overall impression.

1 (poor)                      2 (fair)                      3 (average)                      4 (good)                      5 (outstanding)

Other Comments?: