The Department of Chemistry and Biochemistry
Assessment Report– **MS Program Fall 2016**

For clarity, the first part of this document includes statistics for both MS and Ph.D programs because students enter graduate program as Ph.D. students. Our program does not admit students directly into the MS degree program. Doctoral students in consultation with their research advisors make the decision to switch to an MS track for reasons beyond the scope of this document. This decision to change status usually occurs during or after second year of graduate school. The second part of the document addresses the MS degree programs (chemistry and biochemistry) in our department.

Facts about the Program

- 74 graduate students were enrolled in Fall of 2013.
- 68 graduate students were enrolled in the Fall of 2014
- 67 graduate students were enrolled in the Fall of 2015.
- 67 graduate students are enrolled in the Fall of 2016.

Table 1 below provides the number of graduate students in the program based on entering class year. As of Fall 2016, 2 students are on a coursework MS track (both in chemistry) and 2 students are pursuing a thesis based MS (both in chemistry. All other students aim to graduate with a Ph.D.

Table 1 – Number of Current Students According to Entering Year

2016	2015	2014	2013	2012	2011	2010	2008
12	10	11	10	10	7	5	1

Qualifying Exams

Every student that enters the Department in their first year is admitted to the Ph.D. program. No student enters the program at a master degree level. All first year students take qualifying exams (proficiencies) required by the department to demonstrate their preparedness for an advanced degree. Students are required to pass 3 proficiency exams in their first year of graduate school to remain in good standing with the department. The exams are offered 4 times a year and except for the structural and molecular biology exam, all exams are standardized American Chemistry Society (ACS) exams given in 5 different sub-disciplines. For all exams students can receive a Full Pass (FP) Master Pass (MP) or a No Pass (NP) score. As determined by the ACS norms, a FP score is set at the 55^{th} percentile or better, the MP is set at ~ 50^{th} percentile and scores below the 50^{th} percentile are considered a NP. The names and results for each student who took proficiencies in the classes of 2015 and 2016 appear in Appendix A (data not shown).

Entering Class of 2013 Of the 14 students that entered the Ph.D. program in 2013, all students passed their proficiency requirement in their first year of graduate school for a **100% success rate**. One student who transferred into the program did not have to take the qualifying exams.

Entering Class of 2014 Of the 11 students that entered the Ph.D. program in the Fall of 2014, all students passed their proficiency requirement during their first year of graduate school for a **100% success rate**.

Entering Class of 2015- Of the 10 students that entered the Ph.D. program in the Fall of 2015 and took proficiencies, all students passed their exams in their first year for a **100% success rate**.

Entering Class of 2016- Of the 12 students that entered the Ph.D. program in the Fall of 2016, 2 students have pass all proficiencies in the first round, 3 students have passed 2 exams, 2 students have passed 1 exam, and 4 students have not received a full pass on any exam. All students have 3 more chances throughout the academic year (2016-2017) to pass three qualifying exams.

Comprehensive Exams

MS students do not have to pass a comprehensive exam required by the department and the Graduate School. However, students that make the decision to switch to an MS program may have completed the requirement. 3 MS students passed their comprehensive exam requirement before switching to the MS track.

Graduation Rates

Table 2 summarizes our department's graduation success for the last 7 years. Included in Table 2 are the average numbers of credits for graduation, and average number of years to graduate with either an MS or Ph.D. The names of students who graduated in the Fall of 2014, 2015 and through summer of 2016 appear in Appendix C (data not shown).

Table 2- Graduation Statistics

Year-Degree	N	Average Credits		Average #yrs to graduate
2009				
MS	4	42.5		2.8
PhD	7	76.3		5.7
2010				
MS	3	38		3
PhD	8	80.5		5.4
2011				
MS	7	47.85		3.7
PhD	4	72.5		5
2012				
MS	6	39.5		3.3
PhD	6	78.33		5.7
2013				
MS	4	45.25		3.5
PhD	8	85.15		6.3
2014				
MS	1	47.0		4.0
PhD	13	69.56		5.3
2015				
MS	4	35.66		2.5
PhD	14	67.21		5.8
2016 (through summer)				
MS	3	30		3.0
PHD	7	64.9		6.0

Master's Degree Report-Program Learning Outcomes-Fall 2016

The following learning outcomes were established for both the coursework and thesis Masters of Science (MS) degrees.

For coursework masters' students:

1. Demonstrate mastery of subject content knowledge.
2. Demonstrate effective oral and written communication skills.
3. Demonstrate knowledge of basic lab safety and the requirements to assist in establishing a safe lab environment.
4. Understand ethical issues and responsibilities especially in matters related to professionalism and (if applicable) in matters related the laboratory setting and in writing and publishing scientific papers.

For thesis masters' students:

1. Demonstrate mastery of subject content knowledge.
2. Demonstrate effective oral and written communication skills.
3. Conduct independent research and analysis in their disciple and contribute substantive work in their field.
4. Demonstrate knowledge of basic lab safety and the requirements to assist in establishing a safe lab environment.
5. Understand ethical issues and responsibilities especially in matters related to professionalism, data collection, the laboratory setting and in writing and publishing theses, dissertations and scientific papers.

Data

The Department of Chemistry and Biochemistry's assessment of the MS program was initiated in August of 2014.

In 2012, we had 6 students graduate with MS degrees: 4 students with research-based degrees and 2 students completed coursework degrees. The average number of years to receive the MS degree was 3.3 yrs. All students passed their defenses on the first attempt.

In 2013, 4 students graduated with MS degrees: 1 student with a research-based MS and 3 students with coursework degrees. The average numbers of years it took students to complete the degree was 3.5 yrs.

In 2014, we had one student graduate in the summer with a research based MS. Committee members were able to complete rubrics on the student during the defense in the area of content of knowledge and oral and written communication. This student averaged on the rubric scoring of 3.33/5 for content-based knowledge, 3.08/5 for oral and 2.91/5 for written skills. Clearly, this student was below our desired threshold response of at least 80% of students will be ranked level

4 and 5 in these outcome areas but we anticipate in the future that after collecting more data on our program, we can more effectively assess learning outcomes 1-3 for both of our MS programs. This student passed the defense on her first attempt.

At the end of 2014 we created a different more simplified rubric based on the first 3 learning outcomes (data not shown). Rank categories were unacceptable, acceptable and exceptional.

In 2015, 4 students graduated with MS degrees. Three degrees awarded were thesis based. 100 % of the students scored at the acceptable or exceptional level in content knowledge, mastery of material, and in oral and written communication skills (learning outcomes 1-3).

Through the summer of 2016, three coursework master degrees were awarded. Students were required to have an exit interview with their committee and give a presentation on their experience as a graduate student in the department. No assessment on their presentations were recorded.

We are 100% confident that students understand and will react responsibly when it comes to ethical issues and safety issues (Outcomes 3 and 4 for coursework MS and outcomes 4 and 5 for research based MS). All students who entered the graduate program in 2013, 2014, 2015 and 2016 have completed ethics training with either the Graduate School or the Department of Chemistry and Biochemistry during the Graduate School's orientation in August. All entering students 2013,2014,2015,2016 participated in a 3-day teaching training orientation with Professor Chris Bahn from the Department of Chemistry and Biochemistry. This training included a 45-minute session on laboratory safety. We also had all graduate students who were teaching assistants complete a (~ 2hr) fire safety training session with Skip Hoagland from Safety and Risk Management. Accordingly, all students completed an online laboratory safety course through Safety and Risk Management and had to pass this course in order to be in good standing with the department.

Conclusions

We are confident that the learning outcomes listed above have been demonstrated by MS students in the program and that each outcome was measured and assessed. Collectively, in 2015 and 2016, we have graduated 3 students with theses based MS degrees and 4 students in the coursework MS track. 100% of the students with thesis-based MS degrees scored acceptable to exceptional on the first three learning outcomes.

100% of our students that graduated with MS degrees took the online and classroom lab safety instruction and MS students participated in some type of ethics training online and/or in the classroom.

We will not change anything about our MS programs in the next 2 years. We have meaningful information (despite a small n) that will help us answer the questions of what we learned about our Master program from the assessment report and how to respond if our program needs change.