



OFFICE OF ACADEMIC ASSESSMENT
The UNIVERSITY of OKLAHOMA

Program Assessment Report

2022 - 2023

CAS - Chemistry & Biochemistry (PhD)

General Information

Mission

The Ph.D. degree is awarded for excellence in research and scholarship. It signifies the acquisition of a thorough and comprehensive understanding of a research area as well as the attainment of a high level of professional independence and competence. In addition to finishing a set of coursework, students perform independent research in a laboratory under a mentor to create a Ph.D. dissertation. Students are required to enroll in seminar courses, and present their original research to peers and faculty at least once a year. The curriculum is expected to create a high-level of proficiency in independent research skills, data analysis, and effective science communication.

College

Arts & Sciences

Department/School/Division

Chemistry and Biochemistry

Assessment Liaison

Rakhi Rajan

Research Skills 1

Student Learning Outcome (SLO)

Students will demonstrate the ability to conduct independent literature research and to produce appropriate scientific writings in an area relating to chemistry and/or biochemistry.

Outcome Status

Active

Direct - Course Embedded Assessment

Assessment Method Description

Passing CHEM 5011 and CHEM 5021:

First year graduate students are required to enroll in a two-part Fundamentals course (CHEM 5011 and CHEM 5021) in Fall and Spring semesters respectively. As part of CHEM 5011, students are provided with information on resources for success in graduate school such as to search and read relevant scientific literature, write scientific reports, and learn general skills to navigate the graduate school. In CHEM 5021, students are trained on the aspects related to writing high-quality proposals, as a measure to prepare them for the writing component of their General Examination. In both courses, student performance will be assessed by graded activities such as reports and presentations to the class.

Performance Target

The expectation is >90% of students to perform at satisfactory level.

Related Documents

[SLO - CHEM 5011-5021-2023.pdf](#)

Assessment Results and Use of Results

Reporting Period

2022 - 2023

Assessment Results Entry Date

06/16/2023

Assessment Results

In Fall 2022, 19 students were enrolled in CHEM 5011, and all of them passed the course. The performance is at 100% for this course. In Spring 2023, 17 students enrolled in CHEM 5021, and 16 of them passed the course. The performance is at 94% for this course. Thus, the department met the expected goal of more than 90% student success for this two-series course method that prepares the students with professional skills required for success in graduate school. Two students left the program after Fall 2023 due to personal matters, which reduced the enrollment of CHEM 5021 to 17 in Spring 2023. One student left the program during Spring 2023, which resulted in the student failing the course.

Results Status

Target Met

Number of Students Assessed

36

USE OF ASSESSMENT RESULTS

No Changes Needed

The faculty discussed the results and determined that no changes are needed at this time. However, the faculty will analyze the performance results every year to make any required changes to improve student performance, curriculum improvement, and instructional modifications as needed.

Comments on Use of Assessment Results

First year students who do not satisfactorily complete the Fundamentals courses will be interviewed. Based on the results of this inquiry, it may be appropriate to alter the Fundamentals courses' syllabi either with respect to content or the order in which the topics are presented. If an unsatisfactory performance is determined to be associated with the student's effort (i.e. poor study habits, poor time management, etc.) rather than flaws in the course, the student will be counseled appropriately and remedial work or a change to a different degree program may be recommended.

Direct - Examination

Assessment Method Description

Passing Preliminary Examination:

Second year graduate students in the Ph.D. program will demonstrate preparedness for the General Examination by passing the Preliminary Examination. The students are assessed on their ability to critically analyze a scientific article in their field of study and present the work in the article as a formal presentation to their Ph.D. advisory committee. The committee will assess the student's depth of knowledge on the topic by questions related to the article covering experimental design, analysis of results and potential problems in the scientific design and interpretation of the results.

Performance Target

The expectation is >90% of students to perform at satisfactory level.

Related Documents

[SLO -Preliminary Exam-2022.docx](#)

Assessment Results and Use of Results

Reporting Period

2022 - 2023

Assessment Results Entry Date

06/16/2023

Assessment Results

18 students were admitted to the program in Fall 2021 and 16 of them took the preliminary exam during the 2022-2023 academic year. All the 16 students passed the preliminary exam. Performance = 100%.

Results Status

Target Met

Number of Students Assessed

16

USE OF ASSESSMENT RESULTS

Comments on Use of Assessment Results

The students failing the preliminary exam and their Ph.D. advisory committee will be interviewed by the department to identify the issues related to their failures. Any programmatic issues that caused the failure in the student to pass the preliminary exam will be discussed in faculty meeting and methods will be developed to resolve the issue. If the failure was due to unsatisfactory preparation from the student's side, that will be documented and used as necessary for advising future students in the program.

The two students from the 2021 cohort who did not take preliminary exam in the 2022-2023 year had left the program due to family issue or the advisor moving to a new university.

Research Skills 2

Student Learning Outcome (SLO)

Students will demonstrate the ability to conduct independent laboratory research in an area relating to chemistry and/or biochemistry.

Outcome Status

Active

Direct - Project

Assessment Method Description

Passing CHEM 5080 (Laboratory Rotations):

The first year students are required to participate and successfully pass the course CHEM 5080 (Laboratory Rotations). In this course, the students will perform research for a period of seven weeks each in two laboratories that closely match their research interests. The students will gain an intellectual understanding of a research problem the laboratory is focused on addressing and will contribute towards the research by participating and carrying out research working along the PI and other lab members of the assigned laboratory. Students are evaluated on the quality of a research report that focuses on demonstration of critical understanding of the research problem and data analysis as well as feedback from the faculty hosting the student on student accountability during the rotation period. Students are not evaluated based on whether the experiments worked positively or negatively, rather based on their assessment of the experimental methods and results, and accountability.

Performance Target

The expectation is >90% of students to perform at satisfactory level.

Related Documents

[SLO - Laboratory Rotations-2023.pdf](#)

Assessment Results and Use of Results

Reporting Period

2022 - 2023

Assessment Results Entry Date

06/16/2023

Assessment Results

18 first year students enrolled in CHEM 5080 (Laboratory rotations) in the 2022-2023 academic year. All of them successfully completed the laboratory rotation component with satisfactory grades. Performance = 100%.

Results Status

Target Met

Number of Students Assessed

18

USE OF ASSESSMENT RESULTS

Comments on Use of Assessment Results

First year graduate students who receive unsatisfactory grades for lab rotations will be interviewed to identify specific reasons for poor performance. Based on the results of this interview, students may be assigned remedial work or may be recommended to change to the non-thesis MS degree program. If appropriate, the student may be asked to perform an additional lab rotation.

For the Fall 2022 cohort of 19 students, one student withdrew from lab rotation due to personal reasons. This student left the program in Summer 23, after a leave of absence during Spring 2023.

Direct - Annual Performance Report by Faculty/Adviser

Assessment Method Description

Departmental Annual Graduate Student Evaluation:

Annual evaluation is conducted by the department of Chemistry and Biochemistry for all the graduate students that are enrolled in the program. The assessment is done by the student's Ph.D. advisory committee that includes the graduate college representative as well. The students will fill out a report in a form that is provided by the department ahead of the evaluation. During the day of the evaluation, the student orally presents their accomplishments from the previous calendar year and set goals for the next calendar year. Based on the discussions during this meeting, students are provided feedback both verbally and through a written report that is signed by all the committee members. The signed evaluation report is submitted to the departmental graduate committee who will write their own evaluation letter that is signed by the graduate committee chair and the graduate liaison. Students who had unsatisfactory performance evaluation are communicated to the Graduate College.

Performance Target

The expectation is >90% of students to perform at satisfactory level.

Related Documents

[SLO - Advisory Committee Assessment-2023.pdf](#)

Assessment Results and Use of Results

Reporting Period

2022 - 2023

Assessment Results Entry Date

09/25/2023

Assessment Results

During the 2022-2023 academic year, 64 PhD graduate students were evaluated by their advisory committee and 62 got a satisfactory performance evaluation. Of the remaining 2 students, 1 received a marginal performance on the research aspect and 1 received an unsatisfactory progress assessment. Performance = 97%.

Results Status

Target Met

Number of Students Assessed

64

USE OF ASSESSMENT RESULTS

Comments on Use of Assessment Results

When a student's Advisory Committee reports to the Graduate Committee that the student's research performance is less than satisfactory, the Graduate Committee evaluates the materials provided by the student and the letter provided by the Advisory Committee. If required, the student will be counseled regarding their weaknesses and advised as to how performance can be improved. Student's are usually given additional time to improve the deliverables. Some students may be advised to switch from the doctoral degree program to a masters degree program. The Graduate Committee also assesses the fairness of evaluation among the different students and PhD advisory committees and will take appropriate measures if needed.

Research Skills 3

Student Learning Outcome (SLO)

Students will demonstrate the ability to propose new research directions in an area relating to chemistry and/or biochemistry.

Outcome Status

Active

Direct - Examination

Assessment Method Description

Passing General Exam:

The students are required to take a General Exam in their fourth non-summer semester since their enrollment to the program. As part of this, students will identify a research question(s) that is similar to their on-going research project or on a topic that is different than their on-going research. Students will prepare a hypothesis driven, written research proposal addressing 2-3 sub-areas related to the research question they have selected. Each of these questions are addressed by appropriate research methodology, followed by a proposed method to analyze and interpret the results, along with discussion of alternate methods in case of failure of the proposed method(s). Once the quality of the written proposal is assessed as satisfactory by their Ph.D. advisory committee, the student will move forward to the oral presentation that assesses similar aspects as in the written proposal. Based on a performance evaluation assessing the student's ability of critical thinking, the committee will vote to pass/fail the student. In some cases, students are deemed to be not in the pass/fail category based on their performance and are given an "abeyance" where the student will provide additional materials as decided by their advisory committee to evaluate the gap in their general exam.

Performance Target

The expectation is >90% of students to perform at satisfactory level.

Related Documents

[SLO - Passing General Examination-PhD-2023.pdf](#)

Assessment Results and Use of Results

Reporting Period

2022 - 2023

Assessment Results Entry Date

09/25/2023

Assessment Results

Of the 16 students who passed their preliminary exam in Fall 2022, and are eligible to take their general exam, 15 students took their General Examinations during the 2022-2023 academic year. In addition, 5 students who joined the program in Spring 2021 (one semester late) due to delays from covid-related travel issues also took their General Exam in the 2022-2023 academic year. All of them passed the exam. Performance = 100%. 1 of the students who passed the preliminary exam in Fall 2022 and failed to take the General Exam in the 2022-2023 academic year will work with the departmental Graduate Committee on remediations to satisfy the program guidelines.

Results Status

Target Met

Number of Students Assessed

20

USE OF ASSESSMENT RESULTS

No Changes Needed

Even though we are meeting the success rate specified for the General Exam category, the department is proactively offering help to the students by offering General Exam workshops in Fall semester. The workshop has three parts: (i) graduate liaison discussing the Graduate College paperwork required for the General Exam, along with discussion on components for the written proposal and oral presentation; (ii) a student-led small discussion group tailored to different sub-areas of Chemistry and Biochemistry that is offered by the departmental graduate student organization (CBR, Society of Chemical and Biochemical Researchers); and (iii) a faculty panel from different sub-areas of Chemistry and Biochemistry to answer student questions related to the General Exam. We envision this initiative to reduce the stress and uncertainty related to the General Exam performance that is the qualifier for the Ph.D. trajectory.

Comments on Use of Assessment Results

Students who do not pass their General Examination on their first try will be offered a second chance after discussions with their Ph.D. advisory committee and the Graduate College. If the student does not take and pass the General Examination the second time or decides not to go through with a second exam, they will be removed from the doctoral program. The Advisory Committee will counsel the student and may recommend that the student switch to either the thesis masters program or the non-thesis masters program. If a flaw in the General Examination procedures is suspected, this information will be communicated to the department faculty, who will discuss pertinent issues and recommend appropriate changes to examination methods.

Communication Skills

Student Learning Outcome (SLO)

Graduates will demonstrate the ability to communicate research results to the scientific community.

Outcome Status

Active

Direct - Course Embedded Assessment

Assessment Method Description

Passing seminar courses:

All the graduate students enrolled in the Chemistry and Biochemistry program have to enroll in a seminar during the Fall and Spring semesters, starting in their second semester in the program, by which they have decided the sub-area for their Ph.D. research. This is designed to be a weekly seminar where students present the results from the original research towards their Ph.D. dissertation. Other graduate students and faculty members of the particular sub-area provides feedback on the performance as well as suggestions on research methodologies. Students are evaluated based on regular attendance to the seminar, the quality of their presentation, and ability to address questions from the audience. In addition to this formal seminar course, students also enroll in a 0-credit departmental colloquium during the Fall and Spring semesters. In colloquium, we bring prominent speakers from the different sub-areas of Chemistry and Biochemistry as a means to develop a broader knowledge in closely related fields, to enable collaborations with the visiting scientist, and also to foster networking opportunities for the students.

Performance Target

The expectation is >90% of students to perform at satisfactory level.

Related Documents

[SLO - Passing Seminar Courses-PhD-2023.pdf](#)

Assessment Results and Use of Results

Reporting Period

2022 - 2023

Assessment Results Entry Date

09/25/2023

Assessment Results

139 students were enrolled in seminar courses during the 2022-2023 academic year (counting both Fall and Spring semesters). 138 students passed their seminar courses. Performance = 99%

Results Status

Target Met

Number of Students Assessed

139

USE OF ASSESSMENT RESULTS

No Changes Needed

Even though we met the success criteria specified for this category, extra feedback are being offered to students in the Biochemistry sub-area of the department by providing peer reviews to the presenter. This anonymous feedback from peers will be very impactful than just faculty-based feedback. The department will discuss to other sub-area faculty about using a peer-review form for improved student feedback.

Comments on Use of Assessment Results

The skills needed to prepare and deliver research presentations are critical to the development of independent research scientists. Students who do not satisfactorily complete seminar courses will be critiqued so that they know what aspects to improve and then given opportunities for more practice, either by repeating the same presentation or preparing a different talk. Students who fail due to improper attendance will be documented by the department as failure due to poor student practices. The one student who failed seminar in the 2022-2023 calendar year had left the program since they accepted a job.

Direct - Oral Dissertation or Thesis Defense

Assessment Method Description

Dissertation Defense:

The students have to write a dissertation representing findings from the original research they have been performing towards their Ph.D. degree. The students will also give an oral exam defending their Ph.D. research. The written part is evaluated by all the members of the Ph.D. advisory committee and students are given feedback on improvements if needed. The oral examination is a two part exam, where the first part is an open exam attended by general audience. The second part of the exam is closed where the advisory committee asks questions related to the dissertation research to assess the understanding of the student to compare with what is expected for a graduating student from the department. The results are communicated with the student and the Graduate College using the appropriate form provided by the Graduate College.

Performance Target

The expectation is >90% of students to perform at satisfactory level.

Related Documents

[SLO - Dissertation Defense-2023.pdf](#)

Assessment Results and Use of Results

Reporting Period

2022 - 2023

Assessment Results Entry Date

09/25/2023

Assessment Results

During the 2022-2023 academic year, 10 students held their Ph.D. dissertation defenses. All of them passed in their dissertation defense, and were awarded Ph.D. degrees. Performance = 100%

Results Status

Target Met

Number of Students Assessed

10

USE OF ASSESSMENT RESULTS

Comments on Use of Assessment Results

The Ph.D. dissertation is a written description of original scientific research. We expect students who have achieved "excellence in research and scholarship" to be able to write a dissertation and to explain their work to their peers. Students who are unable to satisfactorily describe their work in written form or to orally defend their research efforts will not be awarded a Ph.D. degree from our department. The students who were unable to pass their Ph.D. defense and their advisory committees will be interviewed to identify issues that caused their failures. If the failure was due to department policies, they will be rectified through faculty discussions. If the failure occurred due to poor student choices and performances, those points will be used for advising the future cohorts.