**STUDENT LEARNING ASSESSMENT PROGRAM**

**SUMMARY FORM 2016-2017**

Master’s Degree in Biological Sciences

**Degree and**

**Program Name:**

# Submitted By:

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**PART ONE**

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| **What are the learning objectives?** | **How, where, and when are they assessed?** | **What are the expectations?** | **What are the results?** | **Committee/ person responsible? How are results shared?** |
| 1. Students will demonstrate a depth of content knowledge appropriate to the Master's level and preparative to successfully fill employment opportunities or enter doctoral or professional programs. | During laboratory exercises and thesis research projects students are assessed for their technical and analytical skills. Comprehensive knowledge of the subject matter is assessed both in theoretical- and laboratory- based courses. In addition, analytical knowledge is evaluated on a 5-point scale during thesis defense presentation. Also, students complete a mandatory exit questionnaire at graduation that assesses various learning objectives on a 5-point scale.  M.S. capstone experience (thesis/research defense, internship defense, or independent research presentation) that includes an assessment of subject-specific knowledge and a general comprehensive examination.  Graduate student employment or admission to doctoral and professional programs.  Graduate assistants are evaluated, over the course of each year, by faculty to whom they are assigned as course assistants.  Student and peer evaluations of students in GTAP program | Graduate students will demonstrate evidence of proper methodology in research projects and competence in graduate courses (as measured by minimum 3.00 GPA required for good graduate standing).  More than 90% of graduate students will pass the defense and oral comprehensive examination on the first attempt.  Graduate students will secure full-time employment or be admitted to doctoral and professional programs following graduation  At the end of each semester, graduate assistants are reviewed by faculty mentors to whom they are assigned.  100% of students (maximum of 4) participating in the program each year are expected to receive positive evaluations as related to subject knowledge. | 100% (62/62) of active graduate students taking courses in AY 16/17), had GPA >3.0. The average analytical thinking score was 4.6/5.0 for thesis research.  100% (25/25) of graduate students who finished in the time period passed their oral thesis/research and comprehensive examination on the first attempt.  100% (25/25) of 2016-2017 graduates were employed in biology-related field or entered Ph.D. programs. We collect this data from the Exit Questionnaire.  31of 32 graduate assistants received positive reviews from faculty.  There were 2 students in the  program in AY 2016-2017. They all received strong evaluations from GTAP coordinator and high scores  (mean > 4.6/5) on student evaluations | Instructors in graduate courses, faculty research mentors, Biological Sciences Graduate Coordinator.  Graduate Coordinator collects assessment data, perform statistical analyses, and creates graphical presentations. The coordinator routinely presents data to faculty and graduate students during faculty meetings, retreats, orientation meetings, and Graduate Student Association meetings. In addition, the presentations are also shared with faculty using the “Bioserver” online portal, which provides an additional avenue for faculty feedback.  Faculty research mentors, graduate student committees, and Graduate Coordinator.    Faculty research mentors, graduate student committees, and Graduate Coordinator.  Faculty mentors  GTAP coordinator evaluates students in the program and shares results with faculty. |

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| 2. Students will demonstrate evidence of advanced scholarship through research activities | Completion of thesis, internship, and independent research.  Presentations at scientific meetings and research publications.  Competition for research grants  Honors competitions | Graduate students will demonstrate the ability to present and discuss evidence of original scientific research in written and oral formats.  Students are expected to present their research at university, regional, and national meetings. Students will publish results of their research in thesis and scientific journals.  Students will submit grants to support their research.  Students will be competitive in graduate school competitions of outstanding thesis and honors awards. | During 2016-17, 100% (32/32) Biological Sciences graduates that graduated published Master’s theses.  More than 52 students presented their research at professional meetings in 2016-17. Graduate students received 57% of Williams travel awards in the College of Sciences and 22% of all awards given last year to present at meetings. 100% of students finishing wrote a thesis. Students published peer-reviewed scientific manuscripts of their research as either author or co-author. Publishing research paper and/or presentation at professional meetings are the ultimate measures of learning in Biological Sciences. **In 2016-2017, Bio student presented their research work at 57 professional conferences, and published 41 peer-reviewed articles in internationally reputable journals.**  Bio students received 96% of research grants awarded in COS or 71% of all research grants awarded by the graduate school last year.  Graduate student was selected as 2 of only 4 inductees into Hammand Scholars Society in 2016-17. Biology graduate student was winner of thesis award in the college of Sciences. A student was selected for distinguished graduate student from Biology Department. | Graduate Coordinator tabulates results and shares data with faculty.  Faculty advisors, grad coordinator  Graduate committee and Council on Graduate Studies  Council on Graduate Studies |

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| 3. Students will demonstrate effective oral and written communication skills | M.S. capstone experience that includes an oral thesis/research defense and oral comprehensive examination.  Graduate Seminar  (BIO 5150)  Student and peer evaluations of students in GTAP program | More than 90% of graduate students will pass the oral thesis/research defense and oral comprehensive examination on the first attempt.  Students will average 75% of available score on all sections of a standard rubric that evaluates content, organization, analysis, language, delivery and questions of final oral presentation.  Students must assimilate and present information to their peers and faculty.  100% of students (maximum of 4) participating in the program each year are expected to receive positive evaluations as related to communication skills. | During 2016-17, 100% (25/25) of graduate students who finished in the time period passed their oral thesis/research and comprehensive examination on the first attempt.  Students (n=25) earned an average score of 22 out of 24 possible points in the assessment rubric employed.  Students (n=32) presented their own work and critiqued others in graduate seminar in 2016-17 as preparation for their final defense and future work.  A student participated in the GTAP program in AY 2016-17. She received strong evaluations from GTAP coordinator and >4.5 /5.0 average scores on student evaluations | Faculty research mentors, graduate student committees, Graduate Coordinator  Any graduate faculty attending final defense seminar  Course instructor  GTAP coordinator evaluates students in the program and shares results with faculty |
| 4. Students will demonstrate critical thinking and problem-solving skills | M.S. is based on independent thesis/research and includes a capstone experience, which includes an oral defense and oral comprehensive examination that includes an assessment of experimental design and data analysis.  Evaluation of graduate research projects, thesis proposal or Internship proposal forms | More than 90% of graduate students will pass the oral thesis/research defense and oral comprehensive examination on the first attempt.  All students will prepare a thesis/internship proposal, approved by their thesis committee, addressing methods, by end of their first year.  Graduate students will develop and carry out experimentally sound and technologically appropriate thesis and / or internship projects | During 2016-17, 100% (25/25) of graduate students who finished in the time period passed their oral thesis/research and comprehensive examination on the first attempt.  All active students in the program have an approved thesis or internship plan on file.  Graduating students demonstrated appropriate skills in research projects in thesis or internship options – of these, 100% completed a research-based thesis based on independent research | Faculty research mentors, graduate student committees, Graduate Coordinator.  Graduate Coordinator tabulates results and shares data with faculty.  Faculty research mentors, graduate student committees, Graduate Coordinator.  Students’ thesis committees assess appropriate technique and methodology on a holistic basis. Proposals and theses are modified until acceptable to the committee. |

**PART TWO**

Describe your program’s assessment accomplishments since your last report was submitted. Discuss ways in which you have responded to the CASA Director’s comments on last year’s report or simply describe what assessment work was initiated, continued, or completed.

We are in the fifth year using a standard rubric for evaluating thesis defense, which can be used to generate numeric scores to augment our traditional holistic assessment.

We have implemented a dual degree master program with the MS sustainable energy. In addition, we have developed a professional science masters-type program in biotechnology, in conjunction with Chemistry and Business, for students looking for technician positions or planning to go on to professional programs. Also, we offered non-thesis MS option starting 2015 AY. The addition of such programs will affect course rotations, potential enrollments, and resource allocation.

**PART THREE**

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? What are your plans for the future?

The department focuses on a student-specific curriculum. This allows students to tailor their coursework to suit their particular area of Biology, and we feel it is a real strength of the program. Given that flexibility, all students need to be competent in experimental design and data analysis, so we emphasize the need for an advanced statistics course or experimental design course for all students, and all students are required to take a seminar course in which they assimilate and present material relevant to their research. The seminar course rotation has been modified to alternate between a topic based course (important for evaluation of primary literature) and a techniques-based (thesis proposal development, presentation skills, writing) course (important for development of critical skill set in the discipline).

The graduate committee has evaluated the current course rotation in an effort to ensure that it offers an appropriate mix of 4000 and 5000 level courses in field and lab-based curricula to support the diverse clientele. The process has also pointed out the ongoing issue of underrepresentation in the bench/cell/molecular areas. This evaluation has been used to increase, or at least balance, the number of cell course offerings and has been useful in hiring decisions.

Biology courses in sustainability are part of the newly developed interdisciplinary Masters program in sustainability, and Biology graduate students are heavily involved in the interdisciplinary PSM program in geographic information systems (GIS). These programs reflect the department’s efforts to foster an interdisciplinary approach to learning and recognition of the value of methodologies outside of standard Biology to study ever more complicated problems.

The comprehensive knowledge exam is a critical tool in our final assessment of students. It has been useful for identifying a rare individual that has not achieved a minimum knowledge base before graduation.

**We have effectively used the assessment data in the past two years to make strategic programmatic changes. These efforts have increased our program quality, which is evident from the high percentage of graduating students successfully employed in jobs related to Biological Sciences and/or admitted to doctoral or professional programs. In addition, the popularity of our graduate program has soared in recent years. As a result, our program size has more than doubled from a decade average of 30 graduate students per year to 64 students in Spring 2017.**

**We would like thank the Center for Academic Support & Assessment for their continued support.**