

**Microbiology Ph.D. Degree Program  
Assessment of Student Learning Plan  
Kansas State University**

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- Check the box if your program's student learning outcomes have been modified since November 2003. If so, please email ([apr@ksu.edu](mailto:apr@ksu.edu)) or attach a hard copy to this document.

**A. College, Department, and Date**

College:        A&S  
Department:    *Division of Biology*  
Date:            *10/11/2004*

**B. Contact Person(s) for the Assessment Plans**

*David A. Rintoul*

**C. Degree Program**

*Ph.D.. in Microbiology (CIP 260502)*

**D. Assessment of Student Learning Three-Year Plan**

**Student Learning Outcome(s) to be assessed**

- 1. Ability to design experiments with appropriate controls, and to conduct original research in a biological discipline.***
- 2. A thorough understanding and/or competency in a specific area of biological science.***
- 3. The ability to apply knowledge through critical thinking, inquiry, analysis, and communication to solve problems and to produce original research in the form of a master's thesis or doctoral dissertation.***

Special rationale for selecting these learning outcomes (optional):

*These three outcomes are essential for completion of all of our graduate degrees. They can all be assessed with measures which are already in place; the preliminary exam and the dissertation defense. Frankly, the preliminary exam and the dissertation defense represent the most stringent, personalized, and effective assessment tools available today.*

Relationship to K-State Student Learning Outcomes (insert the program SLOs and check all that apply):

Program SLOs	University-wide SLOs (Graduate Programs)			Program SLO is conceptually different from university SLOs
	Knowledge	Skills	Attitudes and Professional Conduct	
1. Ability to design experiments with appropriate controls, and to conduct original research in a biological discipline.	X	X	X	N/A
2. A thorough understanding and/or competency in a specific area of biological science.	X	X		N/A
3. The ability to apply knowledge through critical thinking, inquiry, analysis, and communication to solve problems and to produce original research in the form of a master's thesis or doctoral dissertation.	X	X	X	N/A

**2. How will the learning outcomes be assessed? What groups will be included in the assessment?**

*SLO #1 (Ability to design experiments with appropriate controls, and to conduct original research in a biological discipline.) – All of our graduate degrees are research degrees. Students must, as part of degree requirements, perform original research. Training in a research lab includes training in experimental design and inclusion of appropriate controls, regardless of biological subdiscipline (ecology through molecular biology). The preliminary exam (admission to candidacy for the doctoral degree) requires candidates to propose and defend a research proposal. In this proposal the ability to design experiments and develop appropriate controls is judged by a supervisory committee of Ph.D. degree-holding biologists. Thus admission to candidacy is a measure of the student's mastery of these aspects of the outcome. Successful defense of the doctoral dissertation, as judged by a supervisory committee of Ph.D. degree-holding biologists, is also solid evidence that the student has mastered all aspects of this outcome. These are both direct measures. They measure Knowledge (KSU Graduate SLO #1) by assessing the ability to synthesize data, generate hypotheses, and indeed, generate new knowledge. They measure Skills (KSU Graduate SLO #2) by assessing the ability to perform experiments and analyze data. They measure Attitude & Professional Conduct (KSU Graduate*

*SLO #3) by assessing the ability of the student to learn and apply standards of conduct common to biological research and science in general. Successful cooperation with others (major professor and other lab members) is critical to achieving this outcome; cooperative skills and ethical behavior are thus also indirectly assessed by this metric.*

*SLO #2 (A thorough understanding and/or competency in a specific area of biological science) – Research degrees in the KSU Biology Division require the candidate to focus on a specific research problem in a specific subdiscipline. Successful defense of the doctoral dissertation, as judged by a thesis committee of Ph.D. degree-holding biologists, will be evidence that the student has mastered this outcome. This is a direct measure. This measures Knowledge (KSU Graduate SLO #1) by assessing the ability to synthesize data, generate hypotheses, and indeed, generate new knowledge. This measures Skills (KSU Graduate SLO #2) by assessing the ability to perform experiments and analyze data.*

*SLO #3 (The ability to apply knowledge through critical thinking, inquiry, analysis, and communication to solve problems and to produce original research in the form of a masters thesis or doctoral dissertation) – Each candidate must, as part of the requirements for this degree, write and produce an original dissertation. Acceptance of the dissertation by the supervisory committee and the graduate school will be evidence that the student has mastered this outcome. Prior to that, the ability to pass the preliminary exam (see above) is also a measure of the student’s mastery of this outcome. These are direct measures. They measure Knowledge (KSU Graduate SLO #1) by assessing the ability to synthesize data, generate hypotheses, and indeed, generate new knowledge. They measure Skills (KSU Graduate SLO #2) by assessing the ability to perform experiments and analyze data. They measure Attitude & Professional Conduct (KSU Graduate SLO #3) by assessing the ability of the student to learn and apply standards of conduct common to biological research and science in general, and to write a dissertation in accordance with the standards of the discipline. Typically the results of this research will be published in peer-reviewed professional journals, further reinforcing the mastery of this outcome. Successful cooperation with others (major professor and other lab members) is critical to achieving this outcome; cooperative skills and ethical behavior are thus also indirectly assessed by this metric.*

**3. When will these outcomes be assessed? When and in what format will the results of the assessment be discussed?**

*We will begin (continue) to monitor all of these measurements (admission to candidacy, successful defense of the doctoral research and preparation of an acceptable dissertation) in the spring of 2005. Due to the relatively small number of students completing this degree every year, it will not be possible to rapidly accumulate data. However, the data that are accumulated will be shared with the Division’s Graduate Affairs Committee, which has oversight responsibilities for graduate research and education.*

**4. What is the unit’s process for using assessment results to improve student learning?**

*Due to the small numbers of students completing this degree every year, and due to the fact that each research project/student/major professor combination is unique, we cannot readily use these results to improve individual student learning. If we discern unwelcome trends after several years of accumulating these data (e.g. lower proportion of admitted students who successfully pass their prelims or defend a dissertation), we will take whatever steps seem necessary and practical to address these concerns.*