

## Sample Language for Learning Objectives

### FROM STATISTICS

#### The Learning Objectives of the Program

The Ph.D. program is designed to help students to develop the following:

- Expertise in the subject matter of one of the subfields covered by the School. This is demonstrated through coursework, completion of the comprehensive exams, and the dissertation.
  - Comprehension of a minor field of study. The student may select a minor from among those offered in the School or from any appropriate PhD minor offered at the University of Arizona. The student should work closely with his or her advisor to select an appropriate minor. This is demonstrated through coursework and the completion of the comprehensive exams.
  - Expertise in the research enterprise. This is developed through a sequence of four methods courses, as well as additional research skills pursuant to the particular dissertation project. This is demonstrated by the second year paper and presentation, as well as by the dissertation.
  - Proficiency in written and oral communication. This is achieved by completing written assignments for courses, writing and presenting papers at conferences, submitting papers for consideration at peer-review outlets, and by participating in seminars and workshops. This is demonstrated through the second year paper and presentation, the comprehensive exams, the dissertation and dissertation defense.
  - Experience in the design and delivery of teaching. This is achieved via work as a teaching assistant and an instructor, as well as through participation in School, College, and University-wide training programs. Expertise will ideally be developed across various platforms, including lectures, discussion sessions, and workshops, and in-person, online, and hybrid formats. This is demonstrated through TA and instructor duties, student evaluations, and peer/faculty review.
  - Professionalism in service to colleagues and the School. This is achieved through participation in professional activities, including School and College events, conferences and workshops, and through work as teaching and research assistants. This is demonstrated through biannual supervisor and annual faculty evaluations.
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### **FROM SOIL, WATER AND ENVIRONMENTAL SCIENCE**

#### **Expected Learning Outcomes**

The SWES graduate program is grounded in a strong natural science curriculum that represents the foundation for focused studies in environmental physics, chemistry and/or biology. It is designed to train and educate the future generation of environmental scientists, land and water resource managers, engineers, agricultural producers, and policy makers to provide them with the necessary skills to address a wide range of issues facing environmental systems and their intersection with human health and well-being. Graduates should be highly employable in academia, the private sector (e.g., consulting), state, federal and international agencies (USDA, USGS, USFC, NASA, FAO, etc.) and NGOs, and should be well prepared to lead productive lives and confidently pursue their passions. They should be able to address societal needs

pertaining to problems of agricultural production, water quality, natural resource management, and environmental remediation, in a rapidly changing world.

Within this context, expected learning outcomes for both MS and PhD students are:

1. Graduates should possess sound foundational knowledge in the biological, chemical, earth, and physical sciences enabling them to synthesize complex environmental and agricultural problems, formulate problem statements, design experiments, test hypotheses, and provide state-of-the-art solutions in a systematic, creative, and reflexive fashion.
2. Graduates should possess the intellectual flexibility required to view environmental questions from multiple perspectives and be prepared to adjust their understanding as they gain new knowledge.
3. Graduates should be able to actively research data, concepts, histories, and narratives required to address issues that lie beyond their current knowledge base and if necessary consult with scientists from other disciplines.
4. Graduates should be able to lead and function in an interdisciplinary environment and efficiently communicate with biologists, chemists, geologists, physicists, anthropologists, economists, engineers, medical professionals, and sociologists to develop holistic problem solving frameworks.
5. Graduates should be able to communicate in a precise and effective manner and possess comprehensive rhetorical skills in writing, speech, and in digital media.
6. Graduates should be able to understand global issues and learn from and work with people from diverse cultures and other nations.

**In addition, PhD students are expected to:**

1. Gain a deeper understanding of contemporary research methods and tools to be able to independently conduct cutting-edge scientific research and publish findings in top-tier peer refereed journals.
2. Be capable of teaching formal courses and translating research results for public information.
3. Be able to develop sound proposals for scientific research and design experiments, models or field-based inquiry to develop and test hypotheses.
4. Participate constructively in professional activities such as manuscript and proposal review, organizing working groups or symposia, and communicating effectively across disciplinary lines.