

**DEPARTMENT OF ZOOLOGY
GOALS AND COMPETENCIES FOR THE UNDERGRADUATE AND
GRADUATE DEGREE PROGRAMS**

Mission statement of the Department of Zoology:

Zoology is the branch of natural science that deals with animal biology and is concerned with every level of biological organization from the gene to the ecosystem and with the structure, evolution, physiology, behavior, genetics, development, and distribution of animals in all taxonomic groups. Zoology at Michigan State University includes six concentration areas: (1) General Zoology, (2) Cell and Developmental Biology, (3) Ecology, Evolution and Organismal Biology, (4) Genetics, (5) Neurobiology and Animal Behavior and (6) Zoo and Aquarium Science. The mission of the Department is to serve as a focus of excellence in each of these areas with emphasis on undergraduate teaching, graduate education, and research and service. The Department's mission is: (1) to prepare scholars in each of the six concentration areas who are capable of productive careers in animal biology or are well prepared for additional graduate education in their chosen field; (2) to prepare scholars at the graduate level for careers in teaching, research, and service; (3) to provide basic understanding of animal biology to students in other majors in the University; (4) to conduct basic and applied research of national and international significance in animal biology in each of the six concentration areas so as to increase knowledge about animal biology; and (5) to provide the service and outreach expected from the faculty of an land-grant university to the citizens of the state, nation and world.

The degree programs (BA, BS) of the Department of Zoology (and including Environmental Biology/Zoology) are designed to allow students to accumulate a certain level of biological understanding in the following areas:

1. Acquire knowledge base of facts about biological diversity of animals including analysis at the levels of genes, cells, organs, individuals, interactions of individuals, populations, and ecosystems.
2. Develop an understanding of the principles of genetics and the mechanisms leading to diversity (Mendelian, molecular and population genetics). Ability to use genetic analysis on a biological problem.
3. Develop an understanding of the principles of evolutionary theory and the mechanisms involved (natural selection) in creating diversity.
4. Acquire knowledge about animal structure and function.
5. A focus on the integration of understanding of biological problems (e.g. behavior) at the genetic, molecular, developmental, organismal and ecological levels of analysis.

6. Sufficient mathematical, chemical and physical science background to understand biology by the concepts and tools used in these disciplines.

7. An understanding of the history of ideas in biology and comprehension of the frontiers of knowledge in biology.

8. Consideration of the larger role of biology in society.

In addition the following analytical and communication skills will be gained:

1. Use of the scientific method and experimental design for problem solving. Ability to develop hypotheses, formulate appropriate tests, observe and acquire results, critically discuss the results and make conclusions.
2. Critical thinking skills in the analysis of data and hypotheses involving logical reasoning and statistical analysis. Ability to comprehend and critically evaluate scientific literature.
3. Communication skills: Give orally and in writing clear, thorough and effective presentations of complex scientific ideas.
4. Research skills: Become competent in using lab and field-based methods of scientific experimentation. Gain an appreciation of the methods by which knowledge is attained.
5. Computer skills. Use of software programs, the library and the internet to acquire and use information.
6. Self-learning skills. Develop the ability to ask questions and discover answers through one's own efforts.

The M.S. and Ph.D programs in the Department of Zoology have in addition to the goals and competencies of the undergraduate program the following:

1. A focus on a thorough knowledge of a specific research topic dealing with one or more of the following areas: genetics, cell and developmental biology, physiology, morphology, neurobiology, organismal biology, animal behavior, ecology and evolution.
2. The ability to formulate a specific research plan and carry out original independent research on a hypothesis to be tested in depth concerning novel ideas about animal biology.
3. Mastery of specific and advanced technical research skills (established or novel) that are necessary for testing the hypothesis.

4. Ability to write and present the research topic, and defend the results and conclusions in a public forum.

5. The presentation of the research results to the larger community of scholars in the state, nationally and internationally.

6. Awareness of issues concerning scientific misconduct and maintenance of high ethical standards in research.

7. Acquisition of teaching skills involving oral and written explanations of complex scientific ideas.

The following assessment tools are used for undergraduates in the Department of Zoology:

1. Written examinations and quizzes made by the instructor of the course.

2. Term papers on subjects studied in depth.

3. Discussions (oral and written) of original research literature.

4. Laboratory reports on designed experiments.

5. Oral presentations based on library and other research topics.

6. Annual meeting of faculty within the respective concentration areas to determine where and how the various competencies are being introduced and assessed. Any proposed revisions of the competencies or methods of assessment must be approved by the Departmental Curriculum Committee. (proposed)

7. Capstone courses in the respective concentration areas (proposed).