

SAMPLE LEARNING OUTCOMES FOR UNDERGRADUATE MAJORS IN THE BIOLOGICAL AND AGRICULTURAL SCIENCES

The following pages contain examples of learning outcomes from other educational institutions in the area of the **biological and agricultural sciences**. These examples may be used as a point of departure for developing learning outcomes for the majors in your department or program.

Other educational institutions have posted links to learning outcomes assessment, including Marquette University (<http://www.marquette.edu/assessment/>, with specific learning outcomes at <http://www.marquette.edu/assessment/outcomes/index.shtml>); the University of South Florida, with specific learning outcomes at <http://www.ie.usf.edu/OA/>; and the University of Hawaii at Manoa (<http://manoa.hawaii.edu/assessment/>, with specific learning outcomes at <http://manoa.hawaii.edu/assessment/update/view.php>).

A compilation of other examples of learning outcomes is expected to be posted on a web page on UCR's Institutional Research for Undergraduate Education website (<http://irue.ucr.edu/>) by the time of the Summit on Learning Outcomes and Assessment. A link to this website will also be posted on the UCR WASC website (<http://wasc.ucr.edu>).

The primary resource document regarding learning outcomes assessment is the Assessment Guide from the University of Virginia (<http://www.web.virginia.edu/iaas/assessment/Assessment%20guide.pdf>).

Last year some workshops on learning assessment were held on campus through the Scholarship of Teaching Seminar series. Video tapes of the following sessions are available for review on the Scholarship of Teaching website (<http://www.teaching.ucr.edu/SoT.html>):

- (a) Strategies for establishing educational goals and evaluation procedures for all undergraduate programs: The UC Berkeley Experience [Winter 2008]
- (b) Using ePortfolios for Teaching, Learning, and Assessment [Winter 2008]
- (c) Establishing Measures of Student Outcomes: A Debate on Methods [Fall 2007]

Learning Outcomes for majors in the Biological and Agricultural Sciences, adapted from those developed at the University of Virginia in the Sciences are:

Basic Outcomes (knowledge and comprehension)

- By the end of their first year, all majors can describe, on an exam, the biological structure and function of the cell.
- By the end of their first year, Biology majors can describe, both orally and in writing, Darwin's theory of evolution and natural selection, and provide an example of this process in the animal world.
- In a final exam taken at the end of their second year, majors can describe the structure and reactivity patterns of carbon compounds and the nature of these compounds in living systems.

Higher-Order Outcomes (application, analysis, synthesis and evaluation)

- During an exam, majors can complete a genetic disorder analysis by the end of their third year in the major.

Sample Learning Outcomes for Specific UCR Biological and Agricultural Sciences Majors

BIOCHEMISTRY

Learning outcomes for majors in the School of Molecular and Cellular Biology at the University of Illinois:

MCB majors are required to take a core set of classes that consists of MCB 150, 250, 251, 252, 253 and 354. Students are then able to choose from a wide range of options available to them as advanced courses. The wide array of advanced course options makes it somewhat more difficult to assess learning in general terms in the upper level. Therefore, our focus for now will be on assessing learning within the core courses. Our undergraduate program serves to prepare students for graduate school, professional programs and employment in industry. The desired learning outcomes of the core courses include but are not limited to:

- familiarity with (mastery of) content and concepts in the discipline,
- development of critical thinking skills
- development of problem-solving skills
- development of oral and written communication skills
- development of skills to work effectively in a group
- development of an awareness and understanding of current topics in relation to discipline

For more complete information, including assessment methods in the School of Molecular and Cellular Biology at the University of Illinois, see

<http://www.cte.uiuc.edu/assessment/plans/microbiology08.pdf>

See, also, the additional examples of learning outcomes at the top of this document.

BIOLOGICAL SCIENCES

Goals (learning outcomes) in the Department of Biology at the University of Michigan:

1. To develop in students an appreciation of the levels of organization of life, its diversity, and the processes by which life has achieved its present form.
2. To provide broad training in the theory and modern research practices in the biological sciences.
3. To prepare concentrators [majors] for a career in the health professions, in the field of biology education, or for graduate work in the biological sciences.
4. To provide non-concentrators [non-majors] with an appreciation of the diversity, common themes, and general approaches employed in the biological sciences.
5. To offer research training opportunities in the biological sciences.

For more complete information, including assessment methods, in the Department of Biology at the University of Michigan, see http://www.provost.umich.edu/reports/slfstudy/ir/pdfs/assess/lisa_full_version.pdf, pp. 12-13, 26-27.

For additional examples of learning outcomes see http://www.cte.uiuc.edu/assessment/plans/integrative_biology08.pdf for a discussion of learning outcomes assessment in Integrative Biology at the University of Illinois or see http://uaops.ua.edu/right_arm_x.cfm?col=3&dpt=15&yr=2007&dg=25&prg=12#test for a discussion of learning outcomes assessment at the University of Alabama.

See, also, the additional examples of learning outcomes at the top of this document.

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BIOMEDICAL SCIENCES

The following are the learning outcomes in Biomedical Sciences at Marquette University:

At the completion of the Biomedical Sciences major, the graduate is able to:

1. Explain fundamental concepts in the major areas of biomedical sciences (anatomy, physiology, biochemistry, microbiology, pathology, pharmacology, and molecular pathology).
2. Successfully compete for enrollment in graduate and professional schools and/or careers in the health care field.
3. Demonstrate scientific literacy and apply it to contemporary health care issues.
4. Demonstrate an understanding of medical ethics and a commitment to service to others.

See, also, the additional examples of learning outcomes at the top of this document.

ENTOMOLOGY

Specific examples of learning outcomes from other universities in the area of Entomology have not been located; please see examples from related majors for general guidance.

See, also, the additional examples of learning outcomes at the top of this document.

NEUROSCIENCE

Specific examples of learning outcomes from other universities in the area of Neuroscience have not been located; please see examples from related majors for general guidance.

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PLANT BIOLOGY

Goals (learning outcomes) in the Department of Biology at the University of Michigan:

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2. To provide broad training in the theory and modern research practices in the biological sciences.
3. To prepare concentrators [majors] for a career in the health professions, in the field of biology education, or for graduate work in the biological sciences.
4. To provide non-concentrators [non-majors] with an appreciation of the diversity, common themes, and general approaches employed in the biological sciences.
5. To offer research training opportunities in the biological sciences.

For more complete information, including assessment methods, in the Department of Biology at the University of Michigan, see http://www.provost.umich.edu/reports/slfstudy/ir/pdfs/assess/lisa_full_version.pdf, pp. 12-13, 26-27.

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