Course Description with Assignment Description

Course Description [Is this course description from the catalogue sufficient?]

BIOL 311 – Plant Ecology, 4 Credits.
Prerequisite: BIOL 210 (C- or better)
Ecological principles as applied to plants, including global plant distributions, physiological adaptations, population dynamics, and biodiversity. Laboratory focuses on hypothesis testing and experimental design.

Brief Assignment Description [This was not the lead portion of my original assignment description, but I think it should be.]

Question to be answered in this assignment: How might natural selection lead to the evolution of underwater leaves with a different shape (i.e. phenotype) than above water leaves of the same species?

All organisms live and reproduce in environments with multiple stressors or selective pressures. In the context of natural selection and evolution, different stressors may affect survival and/or reproduction in different ways. This means that different phenotypes (e.g. morphologies, anatomies, physiologies, or behaviors) may be selected for in the same environment.

The purpose of this writing is for the student to read and understand a set of facts about the environment and plant phenotypes and formulate a narrative that integrates the given facts, known concepts of natural selection, and how the competing environmental stressors likely result in the evolution of specified phenotypes.

Assignment Student Learning Outcomes [I am writing these from the rubric I have for this assignment]

This and other low score assignments in this course are designed so that students write brief, approximately 1 page, narratives of their understanding of concepts they have learned in the course. I expect this and similar assignments to be a reiteration of the concepts and conclusions we have recently covered in lecture.

I do not assess students' narratives for writing quality, except for the writing as a stand alone narrative / essay. In addition, I assess these narratives for

- Quality of re-presentation of facts,
- Quality of descriptions of the relevant natural selection concepts,
- Quality of integration of facts and concepts, and
- Quality of conclusions correctly drawn based on the integration of facts and concepts.

Students will show their ability to:

- Re-describe a set of facts from the example about the environment, environmental stressors, and plant phenotypes,

- Name all of the three criteria for natural selection to happen,
- Apply each of the three criteria to the example given,
- Draw correct conclusions about how natural selection has led to the evolution of the specific type of the phenotype given.

Rubric – Competing selective forces in the environment
Integration of past material and just so stories
15 points possible

Use √, √-, 0 grading
√ means very good to excellent
√- means fair to good
0 means missing to poor

Broad goal:
- incorporate all of factual information
- show how evolution of narrow leaves would result

Rubric – Competing selective forces in environment	
√, √-, or 0	Content criterion
	incorporates all relevant factual information
	makes clear the role of individuals in natural selection
	makes clear the role of populations in natural selection
	includes all criteria for natural selection in descriptions • phenotypic variation (not included if given to students) • differences in fitness (not included if given to students) • genetic cause of phenotype (not included if given to students)
	provides reasoned explanation of which leaf type evolves and why that type evolves

Course Student Learning Outcomes [I did not find a list of SLOs in my syllabus. I wrote a group of SLOs for Plant Ecology in several hours.]

My colleagues and I talk about ecology, almost always, in the context of Evolution. There are 4 processes that can result in Evolution: mutation, dispersal, genetic drift, and natural selection. In Plant Ecology I focus on the process of Natural Selection as the evolutionary process that results in the phenotypes we call adaptations. The related Course Student Learning outcome is that the student will be able to name and describe the processes of natural selection and how these processes lead to the evolution of phenotypes we call adaptations.

Department Student Learning Outcomes [Program Goals and Learning Outcomes taken directly from Performance Cloud]

The Department of Biological Sciences has four (4) Program Goals (PGs) and each of the Program Goals has several underlying Student Learning Outcomes (SLOs). Our first PG is a goal that students learn generally accepted biological knowledge or core concepts. Our second and third PGs are both core competencies (i.e. skills) that biology students and practitioners require to understand, use, and create concepts in any biological discipline. Our fourth PG is a career development learning outcome. The current assignment SLO and Course SLO address PG1 and SLO1called Evolution.

> The diversity of life evolved over time by processes of mutation, selection, and genetic change. Darwin's theory of evolution by natural selection was transformational in scientists' understanding of the patterns, processes, and relationships that characterize the diversity of life. Because the theory is the fundamental organizing principle over the entire range of biological phenomena, it is difficult to imagine teaching biology of any kind without introducing Darwin's profound ideas. Inheritance, change, and adaptation are recurring themes supported by evidence drawn from molecular genetics, developmental biology, biochemistry, zoology, agronomy, botany, systematics, ecology, and paleontology. A strong preparation in the theory of evolution remains essential to understanding biological systems at all levels.
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> Themes of adaptation and genetic variation provide rich opportunities for students to work with relevant data and practice quantitative analysis and dynamic modeling. Principles of evolution help promote an understanding of natural selection and genetic drift and their contribution to the diversity and history of life on Earth. These principles enable students to understand such processes as a microbial population's ability to develop drug resistance and the relevance of artificial selection in generating the diversity of domesticated animals and food plants. Quoted from AAAS 2011.

General Education Goals or Institutional Student Learning Outcomes

The Natural Science General Education requirements are those most closely connected to our Biology Program Goals. Here is the list of institutional SLOs that fall under the Natural Science General Education requirements:

- Students will be able to describe the scientific methods that lead to scientific knowledge
- Students will be able to report and display data collected, interpret experimental observations and construct explanatory scientific hypotheses
- Students will be able to use theories and models as unifying principles that help us understand the natural world
- Students will be able to identify current issues in which scientific progress may challenge traditional social ideas or present moral or ethical dilemmas

Natural selection and evolution are both theories and models used as unifying principles that help us understand the natural world.