CDI Course Design Example

# BIOLOGY 101 (N=300)

SCIENCE (JUNIOR)

## BIG IDEA

The diversity of life is the result of ongoing evolutionary change.

## PROGRAM LEVEL OUTCOME/GOAL

Use evolution principles to rationalize why and how certain traits and characteristics exist in diverse plant and animal species.

## COMPONENTS

- Readings
- Lecture
- Discussion
- Multiple choice questions
- Very short answer question (40 words)

## LEARNING OUTCOMES FOR THE COURSE

- Define "evolution" not a process of something becoming "better" or "good", but instead a process through which the

## ASSESSMENT

Pre-class online short answer quiz

- Students must agree or disagree with two short evolution-based explanations of two traits. The student must also write a 40 word rationale for their perspective.
    - Average height in the UK has steadily increased because taller people are perceived to be more beautiful, thereby they are more likely to have their genes passed to the next generation
    - Finches have such hard beaks because it allows them to get into a wider variety of seeds (those with hard and soft shells), therefore, they are more likely to survey and pass their genes on to the generation
- TAs will read all of the answers and compile all commonly made mistakes, and post an explanation of what is wrong about each of the arguments
- TAs will read all of the answers and compile all of the "right" arguments, and post an explanation what is right about each of the arguments

Mid-term Exam

M/C choice exam questions with definitions of

- Evolution
- Adaptive
- Natural selection
- Fitness

M/C exam questions asking students to identify the right evolution based explanation for a few different animals and plants

Practice exam in class with iClicker

- 20 multiple choice questions, ask students to answer on the spot
    - After each question, show the iClicker distribution of the class answers
    - Explain what is right about the right answer, and what is wrong about the most popular wrong answers

After the mid-term, in class, review the exam, answer by answer, describing why the right answer is right, and why the most popular wrong answer is wrong. For the question that was most frequently wrong on the exam, offer students the opportunity to write a short answer explaining the right answer (bonus 5 marks or something).

Final Exam

Short answer question asking students to use principles of evolution to explain the following: blueberries shrubs make tasty berries, yet it is thought that these shrubs evolved from a common ancestor with tasteless berries. Use your knowledge of evolution to explain how the tasty blueberry evolved.

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## LESSON PLAN OBJECTIVES

- Identify sound evolutionary arguments for current traits of an animal (e.g. the hyena) and a plant (e.g. the sunflower), including how the environment impacted survival and adaptation.
- Explain how not every trait necessarily has to be adaptive, some traits can be by-products.
- Locate the errors in evolution based arguments for some human behaviour examples.
- Experiment with the use of a flash, and discuss effects of different styles.

## LEARNING ACTIVITIES

Pre-readings

- Chapter 2: Evolution
- Online quiz, for self-testing

35 minute lecture on principles of evolution

- Mutation, Adaptation
- Fitness
- Genes, heterozygous/homozygous

In class activities, two 15 minute activities

- Peer/partner activity to develop a hypothesis to explain using principle of evolutions, the fact that moles are usually blind, but they have a common ancestor that was sighted
    - Discussion should help students come to terms with several hypothesis being legitimate
    - Instructor to call on a few groups to share their hypothesis, and for the instructor to extend learning by commenting on what is right about that, and what is wrong
- Share something from popular media which has used 'evolution' in the incorrect way
    - Peer/partner discussions to discuss errors in the argument
    - Instructor to call on a few groups to share back their discussions