

Course Syllabus

Title

Heredity and Adaptation

Target Audience

This course is intended for pre-service and in-service teachers of life science in grades K-4.

Prerequisites

To successfully participate and complete the assignments in this course, the learner must:

- Be familiar with taking an online course or have completed the PBS “Practice Learning Online with TeacherLine” course.
- Have some experience in grades K-12 classrooms.
- Have an interest in life sciences.

Course Description

This course focuses on three elements: content knowledge, inquiry and other teaching strategies, and use of multimedia and visualization tools in teaching and learning about heredity and adaptation. Heredity and adaptation goes beyond content areas that are generally taught in elementary life science, and provides grounding in these topics to place curriculum in the context of the larger K-12 science scope and sequence. Through the readings, videos, discussions, assignments, and other interactive experiences, learners in this course will have multiple opportunities to develop content knowledge about heredity and adaptation. Learners will experience a rich multimedia, inquiry-based learning environment as their students ideally would in their own classrooms. The course provides effective teaching methodologies, strategies and tools that can be used when teaching life science concepts.

Instructor/Facilitator

See instructor/facilitator sheet.

Credits

To be determined by college or university.

Course Goals

As a result of participating in this course learners will:

- Understand what variations are and how they are passed from one generation to the next.
- Understand why individuals belonging to the same species share many characteristics but also vary
- Explore the effect of variation on survival and reproduction in a population, given a particular set of environmental circumstances.
- Explore how their own understanding of heredity and adaptation can help them prepare students for their own future study of these topics.

Outline of Content and Assignments

Learners in this course are expected to participate in discussions and complete assignments. Learners are also expected to keep a personal notebook (which is not assessed) to keep notes, complete exercises and record reflections about their learning experiences in this course.

Discussion Activities

- **Essential Question** – Each session includes a discussion about an essential question and teaching and learning issues related to this question. Learners post responses to questions posed in the course and respond to posts submitted by their colleagues.

Assignments - Learners are expected to submit assignments. Rubrics are provided for assessment of all assignments, and the course content includes assignment samples.

Assignments in this course include:

- **Writing Assignments** - Short writing assignments (essays) are submitted to the facilitator.

Required Readings

"How Genetic Disorders are Inherited"

"Excerpt from The Botany of Desire"

"NSTA Position Statement on Evolution"

"Dealing with Controversy"

SESSION 1: HEREDITY

Objectives - After completing this session, learners will be able to:

- Define variation and explain its cause.
- Describe why some organisms are identical to their parents and others are similar in some respects but different in others.
- Differentiate between characteristics that are inherited and those that result from environmental influences.
- Develop activities for elementary students that will prepare them for future study of heredity.

Using an inquiry-based approach, the session is divided into the following sections: Invitation, Exploration, Explanation, Application and Putting It into Practice. The **Essential Question** for this session is: ***How does heredity account for variation, and how does variation affect the survival of individuals?***

Activities in this session delve into the differences between characteristics that are inherited and those that are affected by the environment, and examine how DNA passes on hereditary traits. Teaching and learning strategies focus on ways to prepare students for future study of genetics.

The assignment in this session requires learners to describe the relationship between an organism's genes and its physical characteristics.

Discussions in this session focus on finding solutions for the essential question for this session.

Learners will record notes and reflections in their personal notebook about different concepts, methods, activities and ideas presented throughout the session.

SESSION 2: Adaptation

Objectives - After completing this session, learners will be able to:

- Define natural selection and adaptation.
- Describe how variation within a population can affect the survival and reproduction of individuals of that population.
- Describe the process of natural selection and explain how it can result in the adaptation of species.
- Develop activities for elementary students that will prepare them for future study of evolution.

Using an inquiry-based approach, the session is divided into the following sections: Invitation, Exploration, Explanation, Application and Putting It into Practice. The **Essential Question** for this session is: ***How do adaptation and natural selection affect the survival of entire species?***

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Activities in this session delve into the basics of the theory of evolution, focusing on adaptation and the role of variation in natural selection.

Assignments in this session require learners to explain adaptation and to discuss the role variation plays in adaptation. Learners also match their local standards and curriculum to adaptation concepts and share ideas for how they may incorporate those concepts into their instruction.

Discussions in this session focus on finding solutions for the essential question for this session.

Learners will record notes and reflections in their personal notebook about different concepts, methods, activities and ideas presented throughout the session.

Schedule

This course is scheduled to take approximately 30 hours to complete.

Requirements

Learners are expected to:

- Complete all assignments.
- Participate and actively engage in discussions with fellow learners while contributing to the social construction of knowledge.
- Be self-directed and self-motivated.
- Ask for assistance when they need it.

Facilitators are expected to:

- Provide feedback to all learners.
- Participate in discussions to keep them moving forward.
- Provide assistance to learners who need it.

Technical Requirements

- Word Processor
- Internet service provider
- E-mail
- Shockwave and Flash: <http://www.macromedia.com/downloads/>
- Acrobat Reader: <http://www.adobe.com/products/acrobat/readstep.html>
- QuickTime: <http://www.apple.com/quicktime/download/>

Standards of Academic Integrity

As posted on PBS TeacherLine Web site at

http://teacherline.pbs.org/teacherline/help/help_template3.cfm?subID=197

Evaluation

This course is evaluated on a letter grade basis, and graduate credit may be available. See the PBS TeacherLine Web site for details pertaining to specific graduate credit instructions.

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