

TIDES Environmental Education Hub

Life and Environmental Science for Teachers (Sample Syllabus - Course)

Course Information and Syllabus
(3 credits)

Course Description

Designed for future teachers, this course includes topics in social and public policy issues in the environment, resources utilization and conservation, air and water quality issues, ecological succession, and biological diversity. Special attention will be given to current environmental issues and how humans impact them. This course includes lectures, lab activities, group projects, research assignments, computer-based projects, PBL (problem-based learning) activities, video presentations and student-led workshops. You are expected to attend and participate in all class sessions.

Project Learning Tree

To be certified as a Project Learning Tree Teacher and be eligible for PLT classroom resources and teacher workshop, four PLT activities must be completed. Each student will receive a PLT Book as part of this course.

Attendance Policy

Attendance is required since this is a hands-on, experiential learning class. To encourage attendance, 3 points will be deducted for any unexcused absence.

University Policies

This class follows University Policies for:

- *Inclement Weather
- *Academic Honesty/Honor Council
- *Adding/Dropping courses
- *Disability Accommodations
- *Religious Observance Accommodations

Course Objectives

Patterns, energy, information, life's machinery, feedback, community and evolution- These are major themes in life and environmental science. This course focuses on core science and math classes that use science Standards of Learning as an integrating theme.

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Specific Course Objectives

Students will investigate and understand that organisms reproduce and transmit genetic information to new generations, including the role of DNA; characteristics that can and cannot be inherited; genetic engineering and its applications; and historical contributions and significance of discoveries related to genetics.

Students will conduct investigations, which illustrate that all living things are composed of cells. They will be able to diagram and identify cell structures and organelles, and similarities and differences between plant and animal cells.

Students will be able to diagram patterns of cellular organization, including cells, tissues, organs, and systems; and functions and processes of cells, tissues, organs, and systems (respiration, removal of wastes, growth, reproduction, digestion, and cellular transport).

Students will investigate and understand the basic physical and chemical processes of energy transformations in living systems including photosynthesis, fermentation, respiration and energy and matter flow through ecosystems.

Students will be able to provide examples of how organisms change over time. Key concepts include the relationships of mutation, adaptation, natural selection, and extinction; evidence of evolution of different species in the fossil record; and how environmental influences, as well as genetic variation, can lead to diversity of organisms.

Students will plan and conduct investigations in which

- * data are organized into tables showing repeated trials and means;
- * variables are defined;
- * SI (metric) units are used;
- * criteria are established for evaluating a prediction;
- * models are constructed to illustrate and explain phenomena;
- * sources of experimental error are identified;
- * dependent variables, independent variables, and constants are identified;
- * variables are controlled to test hypotheses and trials are repeated;
- * continuous line graphs are constructed, interpreted, and used to make predictions; and
- * interpretations from the same set of data are evaluated and defended.

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Course Topic Schedule:

Aug 29	Introductions/ Population Ecology (Both)
Sep 5	Environmental Issues /Agriculture & Food Supply
Sep 12	Cycles/Forest Management
Sep 15	Canoe Trip
Sep 19	Water Quality/ Chesapeake Bay Issues
Sep 26	Farm Tours
Oct 4	Scientific Method: Midterm review, Notebook check, & Comprehensive planning
Oct 10	Climate Change
Oct 17	Cells
Oct 24	STEM Night and DNA and systems
Oct 31	Service Learning Action Project and online assignment
Nov 7	Evolution/Biodiversity
Nov 14	Genetics
Nov 21	Alternative Energy and air quality
Dec 5	Dukeville project presentation due and notebooks due
Dec 12	Place Value wrap up and reflection
Other projects approved by instructors	

Cluster Three Learning Objectives Addressed in This Course

Through lectures, class discussion, and hands-on activities, students will be able to:

- Describe the methods of inquiry that lead to mathematical truth and scientific knowledge and be able to distinguish science from pseudoscience.
- Use theories and models as unifying principles that help us understand natural phenomena and make predictions.
- Recognize the interdependence of applied research, basic research, and technology, and how they affect society.
- Illustrate the interdependence between developments in science and social and ethical issues.
- Formulate hypotheses, identify relevant variables, and design experiments to test hypotheses.
- Evaluate the credibility, use, and misuse of scientific and mathematical information in scientific developments and public-policy issues.

Explanation of Student Evaluation/Grading

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1. Weekly Activities/ Lessons: (20 points)

Find 2 activities of the previously covered topic for the grade level of your choice. File these in an activity 3-ring binder. Follow grading rubric for details. All lessons/activities must include a cover page in the format provided. This book will be returned for future use in your classroom. (24 total activities minimum in addition to class lesson handouts)

2. In Class Participation: (48 points)

Completion of warm-up quizzes, participation in discussion, completion of class projects and engagement in hands-on activities is essential. 2 points can be earned each class for active participation. 2 points can be earned from quizzes. (4 points per class total)

3. Journal Response: (12 points)

Questions will be posted on Canvas which must be responded to by the next scheduled class meeting. Responses must contain complete thoughts and be thorough. Late blogs will not be accepted. 3 points can be earned for each blog. Four discussion questions will be posted for the semester. Typical response 1-2 pages.

4. Lesson Plan / Activity: (10 points)

Alone, or with a partner, construct a lesson plan that addresses one of the topics covered in class. Use the format provided. Teach a class and conduct an activity from the plan. Lesson plan as well as presentation will be evaluated. A bulletin board plan must be designed to introduce your topic on an 8.5 by 11 piece of paper (2 Points Bulletin Board/ 8 Points Activity).

Lesson Sept 19 on Water Quality

Lesson Oct 10 on Climate Change

Lesson Oct 17 on Cells

Lesson Nov 7 on Evolution/Biodiversity

Lesson Nov 14 on Genetics

Lesson Nov 21 on Alternative Energy and air quality

5. Final project: (10 points)

- Participate in a hands-on, outside of normal class time field-study/activity. (Canoe Trip, Water Quality Analysis, Other Experience as Approved)
- Write and illustrate a children's book of a covered topic
- Prepare an I-Movie of a topic covered in class

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- Visit an elementary or middle school science class – assist or teach a concept in science-construct lesson plan/bulletin board
- Develop a classroom game or activity that can be used in the elementary, middle school, or high school science classroom- use this in the classroom with a teacher and students
- Other projects approved by the instructor