

BIOL 301-001 Field and Natural Science

INSTRUCTOR

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COURSE OVERVIEW

The fundamental goal of this course is to enhance both **science content knowledge** and **pedagogy** of preservice elementary/middle level teachers and those pursuing careers in environmental education. An emphasis is placed on applying the concepts of field science and natural history to the education of students in grades 4-9 in both formal and informal settings. You will integrate environmental science concepts into instructional formats and design both in-class and field-based learning experiences.

THEORETICAL BASIS

The course is grounded in sociocultural constructivist model of learning. The basis of this model is such that learning requires active processing of information and critical thinking regarding concepts. In addition, knowledge and understanding, while socially mediated, is constructed individually and not dispensed by the instructor. *Your participation in class activities, discussion, and reflection are critical to processing of information; thus, attending class prepared is vital.*

COURSE LEARNING OUTCOMES

1. Describe indicators (Chemical, Physical, and Biological) of general environmental quality, and describe human impact on general environmental quality.
2. Describe indicators (Chemical, Physical, and Biological) of aquatic environmental quality, and describe human impact on aquatic environmental quality.
3. Compare/Contrast the importance and relationships of these indicators to the quality of the Chesapeake Bay Watershed, and describe human impact on the watershed.
4. Collect and catalog existing data regarding a selected indicator of environmental quality.
5. Use environmental quality data to propose an environmental action project appropriate for a middle level teacher to conduct with students.
6. Discuss the philosophical and theoretical aspects of place-based education that impact its practice.
7. Implement an investigation of a local environmental issue and present the results of the investigation.
8. Plan, organize, and lead an interpretive station at the zoo that is intended to educate the general public.
9. Create an “educator’s trunk” for the zoo staff that focuses on a particular concept related to zoo education.
10. Create a field guide that showcases some of the species found in your local area.
11. Describe ecological indicators of terrestrial and aquatic environmental quality.
12. Compare and contrast relationships of these indicators to the quality of the Chesapeake Bay watershed.

13. Collect and analyze data through field study on selected indicators of environmental quality.
14. Explain the philosophical and theoretical aspects of environmental education that impact its practice.
15. Develop pedagogical content knowledge for teaching environmental science in lab-based and field settings.
16. Design curricula aligned with MSDE's K-12 environmental education standards and the Next Generation Science Standards.
17. Propose an environmental science field trip site appropriate for middle-level age children that focuses on a local environmental civic issue.
18. Use the 5 E Constructivist Learning Model as a basis for lesson and unit planning.
19. Discuss implications for teaching and learning of field-based science that impact classroom practice.
20. Plan a classroom and a field based environmental science lesson appropriate for middle level grades that focuses on a local environmental civic issue.
21. Use one traditional and one alternative assessment mechanism to assess student learning.

REQUIRED TEXTS

- (1) Louv, Richard. (2005). *Last Child in the Woods*. Algonquin books. ISBN 978-1565123913
- (2) Quinn, Daniel. (1992). *Ishmael*. New York: Bantam. ISBN 0-553-37540-7
- (3) Project Learning Tree Prek-8 Guide (obtained through instructor)
- (4) Focus on Forests (obtained through instructor)
- (5) Forests of the World (obtained through instructor)
- (6) Blake, R.; Frederick, A.; Haines, S.; and Lee, S. (2010). *Inside-Out: Environmental Science in the Classroom and the Field*. NSTA Press. ISBN 978-1-935-155-11-9
- (7) Environmental Concern: *WOW The Wonders of Wetlands*. ISBN 978-188863-1005

ARTICLES (found under Course Readings on Blackboard)

- (8) Lieberman, G. A., & Hoody, L. L. (1998). *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning*. State Education and Environmental Roundtable, San Diego.
- (9) Ghent, C.; Trauth-Nare, A.; Dell, K.; & Haines, S. 2014. The Influence of a Statewide Green School Initiative on Student Achievement in K-12 Classrooms. Journal of Applied Environmental Education. 13(4): 250-260. [DOI 10.1080/1533015X.2014.983658].
- (10) Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. The Journal of Environmental Education, 21(3), 8-21.

SCIENCE CONTENT STANDARDS

This course will address numerous national and state science content standards, with specific focus on preparing you to plan and implement instruction aligned with Maryland State Department of Education's environmental science standards, which are listed here and on Blackboard.

Goal 6: Environmental Science	
	The student will demonstrate the ability to use the scientific skills and processes (Core Learning Goal 1) and

	major environmental science concepts to understand interrelationships of the natural world and to analyze environmental issues and their solutions.
Sub-goals include:	
6.1	The student will explain how matter and energy move through the biosphere (lithosphere, hydrosphere, atmosphere and organisms).
6.2	The student will investigate the interdependence of organisms within their biotic environment.
6.3	The student will analyze the relationships between humans and the earth's resources.
6.4	The student will develop and apply knowledge and skills gained from an environmental issue investigation to an action project that protects and sustains the environment.

InTASC STANDARDS FOR TEACHER PREPARATION

This course adheres to InTASC standards for teacher preparation. Expect to develop skills related each of the standards below.

Standard 1	Learner Development The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.	Standard 6	Assessment The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher and learner's decision-making.
Standard 2	Learning Differences The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.	Standard 7	Planning for Instruction The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.
Standard 3	Learning Environments The teacher works with others to create environments that support individual and collaborative learning, and that encourage positive social interaction, active engagement in learning, and self-motivation.	Standard 8	Professional Learning & Ethical Practice The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet learners' needs.
Standard 4	Content Knowledge The teacher understands the central concepts, tools of inquiry, and structure of the discipline(s) he or she teaches and creates learning experiences that make these aspects of the discipline accessible and meaningful for learners to assure mastery of the content.	Standard 9	Leadership & Collaboration The teacher seeks appropriate leadership roles and opportunities to take responsibility for student learning, to collaborate with learners, families, colleagues, other school professionals, and community members to ensure learner growth, and to advance the profession.

Standard 5	Application of Content The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues.	Standard 10	Technology The teacher uses available technology not as an end in itself, but as a tool for learning and communication, integrating its use in all facets of professional practice, and for adapting instruction to meet the needs of learners.
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STUDENT RESPONSIBILITIES

As a future educator, you should model the behaviors and dispositions of a professional. These include:

ATTENDANCE. Your presence in class is required for your success in developing understanding of science concepts and professional skills required to competently teach science. You are expected to arrive to class promptly and remain in class for the duration of the period. Absences and tardiness will affect your final grade.

- You are allowed one (1) unexcused tardy. Unexcused absences will result in a zero for that day's participation. Unexcused tardies will result in point deductions for that day's participation. **CLASS WORK CANNOT BE MADE UP AT A LATER DATE.**
- If you have a legitimate reason for absence, you should contact the professor in writing at least 48 hours in advance. To have the absence excused, you will have to provide documentation. Bear in mind that you will not receive a zero, but your final grade will be calculated with fewer total points.

PROFESSIONAL PARTICIPATION. You are expected to take initiative during classroom discussion and practice classroom etiquette that gives full attention to the professor or peer who is speaking. At all times, you should be respectful of others, which means you should refrain from cell phone and off-task internet use during class.

ACADEMIC WORK. Given the interactive nature of this course, you are expected to complete assignments and readings by the due date. You are expected to demonstrate the ability to effectively process information and experiences using high level thinking processes, including analysis, synthesis and evaluation.

- All written assignments must be typed, 12-point font, double-spaced, 1 inch margins on all sides. Professional writing demonstrates the conventions of Standard English including clarity of expression and attention to grammar, sentence structure, and spelling.
- All assignments are to be submitted via Blackboard by 1:00 pm on the due date unless otherwise noted.
- Grades for late assignments will be lowered by 5% per day. Every effort will be made to accommodate legitimate reasons for delays if requests are made in writing in advance of the due date.

ACADEMIC INTEGRITY. The course is conducted in accordance with Towson University's Student Code of Ethics and Student Academic Integrity Policy. As your instructor, I am required to report all instances of academic misconduct, including cheating, fabrication, plagiarism, and the facilitation of such acts. If you engage in such acts, you will be subject to appropriate sanctions and you will be reported to the Departmental Chair and/or Dean. It

is always safer to err on the side of referencing all pertinent sources of information. Ask if you have questions. See policy here:

<http://inside.towson.edu/generalcampus/tupolicies/documents/03-01.00%20Student%20Academic%20Integrity%20Policy.pdf>.

AMERICANS WITH DISABILITIES ACT. This course is in compliance with the Towson University policies for students with disabilities. Students with disabilities are encouraged to register with Disability Support Services (DSS), 7720 York Road, Suite 232, 410-704-2638 (Voice) or 410-704-4423 (TDD). Students who suspect that they have a disability but do not have documentation are encouraged to contact DSS for advice on how to obtain appropriate evaluation. A memo form DSS authorizing your accommodation is needed before any accommodation can be made.

DIVERSITY STATEMENT. In accordance with the Towson University Strategic Plan and the Fisher College of Science & Mathematics Diversity Action Plan, everyone participating in this course is expected to be respectful of each other without regard to race, class, linguistic background, religion, political beliefs, sex, gender identity or expression, sexual orientation, ethnicity, age, veteran’s status, or physical ability of characteristics. If you feel these expectations have not been met, please speak with your instructor or the designated diversity liason, Dr. Cindy Ghent, cghent@towson.edu.

GRADING POLICY

Your grade will be calculated as follows:

Reading responses and reflections	180
Field-based activities	80
Zoo Station	100
Educator Trunk	100
Field Guide	50
Exams	200
Environmental Action Project w/ Field Trip	225
TOTAL	935

NOTE: number of possible points for the course is tentative based on the schedule of course activities

GRADING SCALE

	A	A-	B+	B	B-	C+	C	D+	D	F
%	100-92	91.9-89	88.9-86	85.9-82	81.9-79	78.9-76	75.9-70	69.9-66	65.9-60	<60
total pts.	935-860	859-832	831-804	803-767	766-739	738-711	710-655	654-617	616-561	<561

NOTE: Earning final grade of **A** requires consistently exceptional work and effort.

COURSE ASSIGNMENTS

- I. **Course Readings. (15 points each, 180 points total)** BEFORE CLASS, read assigned articles and chapters of course books. Be prepared to discuss what you read during

class time. You will respond to writing prompts and submit your responses on Blackboard prior to class.

HELPFUL TIP: While reading, you should underline important concepts/ideas in the book/article and write notes in the margins. Bring the book/article with you to class. Expect to discuss these readings in class, especially the implications of content for environmental education.

- II. Field-based Activities (20 points each, 80 pts. total)** In order to fully understand science concepts related to environmental education, you will participate in several field studies in which you collect, analyze and evaluate data as indicators of environmental quality. EXPECT TO GET WET, DIRTY, AND MUDDY. PLEASE WEAR APPROPRIATE FOOTWEAR AND CLOTHES THAT CAN GET DIRTY.

Rubric for Field-based Activities

Dimension	Collaboration in Data Collection	Participation in Data Analysis and Interpretation	Quality of Written Work
Points possible	5	5	10
Description	You are expected to fully collaborate with your team or the class during field-based activity. You will take an <u>active role</u> in setting up the investigation, collecting all the required data, and organizing materials as necessary.	You are expected to work eagerly and cooperatively with your team or the class to analyze and interpret data collected in the field. You will actively participate with your group or the class in discussions designed to facilitate data synthesis.	Your written work will be evaluated holistically based on the following criteria: organization of data, clear and thorough analysis of data, accurate and thoughtful interpretation of data, clear conceptual connection between data analysis and science concepts covered in class (i.e., synthesis of data and concepts).

Note: Field-based activities require collective effort. As a result, these activities cannot be made up in the event of an absence.

- III. Zoo Education Station (100 points total)**

Create an educational station that targets children of middle school age (grades 4-9) for use at the zoo by zoo visitors and zoo education personnel.

- IV. Zoo Education Trunk (100 points total)**

Create a set of activities appropriate for middle grades learners focusing on an environmental issue and the affects human have (both positive and negative) on that issue. Assume these activities will be used by zoo personnel and/or classroom teachers.

- V. Field Guide (50 points total)**

You may work in pairs to complete your field guide. Your field guide will be divided into four parts: deciduous forest, streams, and two other habitats found in Maryland. For **each section**, you must include 2 bacteria or protists, 2 invertebrates, 2 vertebrates, and 2 plants, for a total of 32 specimens. Each specimen page should include a physical description of the organism, its habitat, size, general behavioral and feeding characteristics (except plants), and an illustration of the organism.

VI. Exams (100 points each, 200 points total) Two exams with a variety of forced-choice (multiple choice, matching) and open-response items will evaluate your understanding of science concepts and environmental education pedagogy covered in course readings and in-class activities.

VII. Environmental Action Project (EAP) (225 points total)

You will fully plan an environmental action project appropriate for middle school students for implementation at a school or informal education site. Each project will have a clear **rationale**, planned **learning experiences** for the intended age group of students, and an **action component**. Learning experiences will include written lesson plans with clear learning objectives appropriate for classroom and outdoor settings. You are expected to integrate at least one other discipline (social studies, math, ELA, art, etc.) The project should include a field trip to a site related to your action project.

Part I. Project Proposal (50 points). Submit a draft of your action project that includes major components.

Part II. Project Presentation (50 points). Present a preliminary environmental action project plan to the class. Use the feedback provided during this presentation to revise/enhance your final project.

Part III. Final Project (125 points). Comprehensively compile into a final project: action plan narrative, driving questions, lesson plans and assessments, and student action component, all linked to appropriate national and state standards.

SCHEDULE OF COURSE TOPICS AND ASSIGNMENTS

Class	Topics	Readings and Course Assignments ¹
8/30	Introduction to course goals; Rationale for EE MWEE; Next Generation Science Standards Maryland Environmental Literacy Standards	<i>Inside Out</i> -Introduction
9/6	Issue Investigations	<i>Louv</i> Part I, writing response

¹ Course readings and out-of-class assignments are to be completed before class begins. Assignments should be submitted to Blackboard by 1:00pm on the due date.

	Field-based activity/Descriptive Study – What Plants & Animals Use the Schoolyard Habitat?	<i>Inside-Out</i> Ch. 6 pages 117-118
9/13	Land Biodiversity- Setting Pit-Fall Traps; PLT Activities	Analysis of Schoolyard Habitat Issue Investigation Due <i>Louv</i> , Part II, writing response <i>Inside-Out</i> Ch. 6 pages 115-117
9/20	Land biodiversity-Leaf Litter Fun/Analyze Pit-Fall Traps; PLT Activities	<i>Louv</i> , Part III, writing response
9/27	Soil Investigations	<i>Inside-Out</i> Ch. 4-Soil <i>Louv</i> , Part IV, writing response
10/4	Field-based activity/Comparative Study – Field, Forest, & Stream	Action Project Proposal Due <i>Louv</i> , Part V, writing response
10/11	Field-based activity/Comparative Study – Field, Forest, & Stream Exam 1	STUDY FOR EXAM 1
10/18	The Chesapeake Bay Watershed; Project WET activities	Analysis of Field, Forest, & Stream Issue Investigation Due <i>Louv</i> , Part VI, writing response <i>Inside-Out</i> Ch. 2- Physical

		Geography and pg. 96-99
10/25	Field-based activity- Watershed Investigation	Zoo Educator Trunk Due <i>Louv</i> , Part VII, writing response
11/1	Field-based activity/Correlative Study- Stream Assessment Part I	Analysis of Watershed Issue Investigation Due <i>Ishmael</i> Sections 1-5, writing response
11/8	Field-based activity/Correlative Study- Stream Assessment Part II; Project WET Activities	Zoo Education Stations Complete by Today <i>Inside-Out</i> Ch. 3-Water and Ch. 5-Energy & Nutrients and Ch. 6 pages 119-123 <i>Ishmael</i> Sections 6-9 writing response
11/15	Forestry	Analysis of Stream Issue Investigation Due <i>Ishmael</i> Sections 10-13, writing response
11/29	WOW! The Wonders of Wetlands	Field Guide Due

	Student Action Project/MWEE Presentations	<i>Hungerford and Volk</i> , writing response
12/6	WOW! The Wonders of Wetlands Student Action Project/MWEE Presentations	<i>Ghent, Trauth-Nare, Dell, & Haines</i> , writing response
12/15	<p style="text-align: center;">FINAL EXAM WEEK</p> <p style="text-align: center;">Exam 2, 3:00-5:00 PM</p> <p style="text-align: center;">Final Project Due</p>	