



Teaching Units for High School Science Developed by
Duke University Graduate Students in Pharmacology 693/694
Master of Arts in Teaching (MAT)

<http://sites.duke.edu/rise/duke-courses/pharm-693694/>

Daily Lesson Plan

Course Name: AP Environmental Science/AP Biology	Ⓢ Standard Ⓢ Honors ● AP
Unit Title: Ecological Health of the Ellerbe Creek Watershed and its Environmental Implications	Day/Date: Day 11 of 16
Relevant NC Standard Course of Study Goal(s): <ul style="list-style-type: none"> • Bio.2.1 Analyze the interdependence of living organisms with their environment. • Bio.2.2 Understand the impact of human activities on the environment. • EEn.2.2 Understand how human influences impact the lithosphere 	
Specific Lesson Objectives	
Students will understand: <ol style="list-style-type: none"> 1. Interactions among living systems and with their environment result in the movement of matter and energy relating to the significance of each to maintain the health and sustainability of an ecosystem. 2. Human activities (including population growth, urbanization, pollution, global warming, burning of fossil fuels, habitat destruction, and introduction of non-native species) may impact the environment from one generation to the next. 3. Humans influence freshwater availability and quality in North Carolina’s river basins, wetlands, and tidal environments. 4. The diversity of species within an ecosystem may influence the stability of the ecosystem. 5. Interactions between and within populations influence patterns of species distribution and abundance. 	
Students will know: <ol style="list-style-type: none"> 1. How humans modify ecosystems through population growth, technology, resource consumption, and production of waste 2. How to interpret data regarding the historical and predicted impact on ecosystems and global climate change 3. That urban development in the North Carolina Piedmont leads to habitat destruction and urban runoff 4. The effects of pesticides, herbicides, and pharmaceuticals on freshwater ecosystem health 5. Non-point sources of pollution 6. How biotic and abiotic factors affect biodiversity 7. How to evaluate the quality of North Carolina streams (chemical & physical properties and biotic indices) 	
Students will be able to: <ol style="list-style-type: none"> 1. Read and interpret a primary, scientific journal article through the lens of the scientific method 2. Analyze collected scientific data 3. Write a scientific research paper that includes the introduction, materials and methods, results, discussion, and literature cited sections 	

Key Vocabulary for this Lesson
<ul style="list-style-type: none"> • N/A
Materials
<ul style="list-style-type: none"> • N/A

Technology Needs
<ul style="list-style-type: none"> • Laptop cart

LESSON ACTIVITIES			
Opening (Hook, Warm-Up, Anticipatory Set, Review, etc.)			
<p><i>Describe activity to elicit active involvement of students or refer to previous learning:</i> <i>Warm-up</i> – From the previous day’s collected data, students will develop the main framework and bullet points for what their joint paper will address in regards to stream ecosystem function and health:</p> <ul style="list-style-type: none"> ○ Stream buffers – width, profile, and vegetation coverage ○ Stream profiling – depth, width, stream flow (volume and speed), turbidity, large woody debris, and erosion ○ Macroinvertebrate collection ○ Water sampling for chemical testing and water quality – dissolved oxygen, nitrogen, phosphorous, pharmaceuticals, detergents, and pH 			
Procedure: Include all sections that apply to this lesson; combine as necessary.			
Section	Time	What the Teacher will do:	What the Students will do:
Statement of Objective & Purpose	5 minutes	1. Teacher will provide an overview of the day: students will complete a quick warm-up to discuss the main points they want cover in their research paper; students will work in their expert groups (each student group was assigned a specific performance task during the field sampling day) to research primary literature to support their findings	1. Listen
Input, Modeling, & Check for Understanding	0 minutes	N/A	N/A
Guided Practice	15 minutes	<ol style="list-style-type: none"> 1. Teacher will help students develop a structure and focus for the research paper 2. Teacher will show students reputable web sources from which to find journal articles to use for sources during the 	1. As a class, students will brainstorm the structure and focus of the research paper, pulling on ideas that were discussed the previous day in regards to scientific journal writing

		writing of the research paper: JSTOR, ISI Web of Science, Google Scholar, etc.	2. Listen
Independent Practice/ Homework	70 minutes	1. Teacher will answer any questions students may have while researching their expert group's topic and guide their searches towards usable material	1. Students will work in their expert groups (stream buffer group, stream profiling group, macroinvertebrate group, chemical analysis group) to research information on their topics to be used in writing the research paper
Closing/ Summary	5 minutes	1. Teacher will ensure all laptops are returned to the cart 2. Teacher will assign homework: students should continue researching journal articles on their topics so that each expert group has at least 10 sources	1. Students will return laptops to carts 2. For homework, students will find additional sources to help support in writing the research paper
Assessment of Student Learning			
<i>How & when will you know that the students have learned this material?</i> Completed student research paper, presentation to Durham City Council			
Differentiation Strategies*			
<i>How will you adjust aspects of the lesson to accommodate student READINESS?</i>			
Struggling Students:	Gifted/Advanced Students:	English Language Learners:	
N/A	N/A	N/A	
<i>How will you adjust aspects of the lesson to accommodate students' LEARNING PROFILES?</i>			
N/A			
<i>How will you adjust aspects of the lesson to accommodate students' INTERESTS?</i>			
N/A			