

Course Syllabus

Class Profile

- Class size averages 28 students in a semester-long course taught over 18 weeks, Monday through Friday, 90 minute class each day. A minimum average of 90 min. per week is dedicated to hands-on lab activities, with one formal lab write-up per unit.

Course Prerequisites

- AP Environmental Science is open to all students, but students are expected to complete Honors Biology and Honors Chemistry with at least a “B” average before enrolling, Students who have completed Honors Earth Science and Biology in good standing also are encouraged to enroll.

Course Overview

- For each unit instruction consists of:
 - Power-point lectures (supplemented with on-line PDF outlines and chapter summaries of all Miller chapters <http://mhs.wcpss.net/teachers/murphy/apes/>)
 - correlated current news events, discussion of current issues
 - frequent inter-active web activities
 - small group learning activities include critical thinking and problem solving
 - weekly hands-on lab activities including one formal lab write-up per unit
 - pertinent science-based videos
 - Cyber-Ed educational software – Population Ecology, Food Webs
- Case studies from University of Buffalo - National Center for Case Study Teaching in Science - <http://ublib.buffalo.edu/libraries/projects/cases/case.html>
- Projects
 - North Carolina Eco-Journal – local environmental issues, media bias, politics and environmental ethics
 - Mini-Ecosystem Study of Pond Ecology – water quality, aquatic ecology, water pollution, food webs
 - Home Energy Audit – fossil fuels, personal footprint, energy conservation, energy calculations
 - Book Reports – one report each on a science-based non-fiction book and a more controversial eco-econ-ethics–cultural-politically charged piece of literature

- Field Trips
 - Wake County Waste-water treatment plant
 - Virtual web field trips

- Optional tours of :
 - Local sustainable farms (Spring Semester)
 - NCSU Solar House (Fall or Spring Semester)
 - NC State Experimental Forest (Fall or Spring Semester)

- Major Debate – at least one major debate per semester, such as “To Drill or Not To Drill – The ANWR Debate”

- Student evaluation
 - Mirroring university level grading, tests and labs are the major components of student assessment, supplemented by quarterly projects. Students are expected to complete all other work as part of their learning experience.

Key Resources

- Textbook –Living in the Environment G. Tyler Miller 14th ed. (Pacific Grove, Calif.: Brooks/Cole Thomson Learning)
- Government and University web sites
- Guest Speakers
 - Wake County N.C. Waste Management

Course Outline

CR	UNIT	TOPICS	TIME	Content	Sampling of Labs and Activities	Major Lab
	S	Reading assignment and Current Events report	Summer	Students compile a series of current events coordinated with the seven content areas of the course and read one environmental book.	Internet, news media, science journals and reports	N/A
I-VII	1	Environmental Science Overview <ul style="list-style-type: none"> Major Environmental Issues History of Conservation Science systems, matter and energy 	1 week	Miller Ch 1, 2 & 3 <ul style="list-style-type: none"> Scientific Method lab and experimental design Variables and controls Sampling Methods Chemistry and Physics overview 	<ul style="list-style-type: none"> Tragedy of Commons activity Something's Fishy – sampling population size Video – Chemistry and Environment 	Salinization Lab – focus on scientific method, experimental lab procedures
I II	2	Ecology <ul style="list-style-type: none"> Principles of Ecology Biodiversity and Evolution 	2 ½ weeks	Miller Ch 4 & 5 <ul style="list-style-type: none"> Basic ecological principles Food Chains/webs Primary productivity GIS Mapping Biogeochemical cycles Evolution basics Ecosystem services 	<ul style="list-style-type: none"> Design Food Web Primary Productivity Lab Primary Consumer Energy Flow Activity Carbon Cycle Game Natural Selection Activity Video – Darwin's Finches Biogeography Islandization – Lizards of Canary Islands 	Biodiversity Lab – small cardboard ecosystems of varying sizes are set up, diversity is compared using variety of biodiversity indices. (Carolina Biological)
I VII	3	Atmospheric Sciences <ul style="list-style-type: none"> Weather, Climate and Biomes 	1 ½ weeks	Miller Ch 6 <ul style="list-style-type: none"> Earth, Sun, Moon relationships Atmospheric Heating Weather basics Climate and Biomes 	<ul style="list-style-type: none"> Tarback's Earth Science Lab Manual – Ex. 12 and 13 Biomes Poster Video – Chasing El Nino 	Weather and Climate Lab – using the Millbrook High School weather station. Data comparisons and analysis over short and long-term.

I II III	4	Species Interactions <ul style="list-style-type: none"> Community Ecology Population Dynamics 	2 weeks	Miller Ch 8 & 9 <ul style="list-style-type: none"> Species interactions Predator/Prey Managing Wildlife Populations Human impacts on ecosystems Ecological stability and sustainability 	<ul style="list-style-type: none"> Video – NGS “Mimicry and Camo” Carrying Capacity activity Case Study – Coyote Removal In East Texas Video – SAF – Wildlife 	Aquatic Food Webs Lab – using mini-pond ecosystems, students explore life in a pond and develop complex food webs
II III VI	5	Homo sapiens <ul style="list-style-type: none"> Human Population Risk, Toxicology and Human Health 	1 week	Miller Ch 11 & 12 <ul style="list-style-type: none"> Risk, probability and hazards Toxicology Diseases Human population dynamics Population age structure 	<ul style="list-style-type: none"> LD 50 Lab Power of Doubling Population Pyramids Exercises Population statistics exercise Disease Poster 	Population Lab – Fruit Fly Population Dynamics Lab
I II IV VI	6	Water <ul style="list-style-type: none"> Aquatic Ecology Water Resources Water Pollution 	2 weeks	Miller Ch 7, 14, & 19 <ul style="list-style-type: none"> Aquatic life zones Water on Earth Man and Water Use Fresh water pollution Marine pollution Drinking water quality 	<ul style="list-style-type: none"> Multi-day Water Quality Lab Video – Biology of Ponds and Lakes Video – Troubled Waters Video – Beaches are Moving Groundwater Contamination Lab 	Water Quality Lab – using Mini-Pond ecosystems, students use various water quality test equipment including DO meters
I IV V VI	7	Agriculture <ul style="list-style-type: none"> Soil Science Food Resources Pest Management 	1 week	Miller Ch 10-Sec 5,6,7 Miller Ch 13 & 20 <ul style="list-style-type: none"> Physical and chemical properties of soils Soil conservation History of Agriculture Farming methods Irrigation Pest management Pesticides IPM 	<ul style="list-style-type: none"> Sustainable Foods Picnic Video – RTSP – Feed The World Video – Biotechnology 	Soils Lab – students collect soil samples and analyze physical and chemical properties of soils

I IV V VI VII	8	Natural Resources and Energy <ul style="list-style-type: none"> • Geology Overview • Mineral Resources • Energy Resources • Energy Conservation 	2 ½ weeks	Miller Ch 10 Sec. 1-4 Miller Ch 15, 16 <ul style="list-style-type: none"> • Origins of Earth • Mineral formation – volcanoes and earthquakes • Mineral extraction and environmental damage • History of Fossil Fuels • Overview of Fossil Fuels • Personal energy conservation • Alternative Energy Resources 	<ul style="list-style-type: none"> • Geologic Timeline • Video – Fire Down Below • USGS “ Dynamic Earth” website • Mining lab • Energy calculations • Video – Oil on Ice • Alternative Energy Presentation 	Home Energy Audit Lab – students complete an energy audit of their home, including calculations for electrical usage and pollution footprint.
VI VII	9	Search for Clean Air <ul style="list-style-type: none"> • Air Pollution • Climate Change • Ozone 	1 week	Miller Ch 17 & 18 <ul style="list-style-type: none"> • Earth’s atmosphere • Types of air pollution • Effects of air pollutants • Preventing air pollution • Natural climate change • Man’s effect on global climate • Ozone – top to bottom 	<ul style="list-style-type: none"> • Video – Search for Clean Air • Particulate Matter lab activity • Video – What we know About Global Climate Change 	Ozone Lab – performed on the first hot , sunny day of the semester, students take ozone measurements in a variety of locations, near and away from highway traffic, as well as look for ozone damaged plant life.
I II III VI VII	10	Sustaining Biodiversity <ul style="list-style-type: none"> • Wild Species • Terrestrial Biodiversity • Aquatic Biodiversity 	2 ½ weeks	Miller Ch 22, 23, 24 <ul style="list-style-type: none"> • Status of the earth’s wild species • Man’s effect on biodiversity • Extinction rates • Habitat loss • Over-harvesting • Non-native species • Protecting wild species • Wildlife management • Public lands management • Forestry methods • Managing world fisheries • Wetland protection • Ecological restoration 	<ul style="list-style-type: none"> • Endangered Species report • PowerPoint – Public Lands management • Land Management Debate 	Forestry Field Techniques Lab – exploratory activity. Species identification, plot inventory methods

IV V VI	11	Life in the Big City <ul style="list-style-type: none"> • Waste • Urbanization 	1 week	Miller Ch 21 & 25 <ul style="list-style-type: none"> • Hazardous waste • Human waste and landfills • Alternatives to wasting natural resources • Low-waste society • Sustainable cities – land use, zoning, city planning • Urban problems 	<ul style="list-style-type: none"> • Field Trip – Waste Water Treatment plant • Guest Speaker – Wake County Waste Management Division 	Waste Treatment Lab – use Carolina Biological Waste Water treatment lab activity
	Semester-long Unit	<ul style="list-style-type: none"> • Politics • Environmental Legislation • Economics • Ethics 	Throughout semester	Miller Ch 26, 27, 28	Throughout the semester the topics of politics, legislation, economics, social and cultural issues are addressed	North Carolina Eco-Journal – students gather 15 quality current events, 5 from each of the three geographic sections of the state, and write a synopsis, bias and opinion essay. Binder must be hand-made from recycled materials and creatively decorated.