Mike Jackson

AP Environmental Science – Course Syllabus2012-13

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Brief Description of the course

AP Environmental Science is aninterdisciplinary introductory course covering the main topics ofenvironmental science. The course follows the outline provided by theCollege Board and is intended to be the equivalent of an introductorycollege course in environmental science. The aim of the course is to"provide students with the scientific principles, concepts andmethodologies required to understand the inter-relationships of thenatural world, to identify and analyze environmental problems bothnatural and human-made., to evaluate the relative risks associatedwith these problems, and to examine alternative solutions forresolving or preventing them." (Acorn Booklet) This course isinterdisciplinary as it draws on aspects of biology, chemistry,geology and physics. The emphasis in this course is on conceptualunderstanding and skill development as well as scientific literacy.Many classes involve a lecture/presentation where the main conceptsare outlined and the students are expected to follow this up withdetailed reading.

Textbook information

The main textbook for the course is:

Environmental Science for AP byFriedland and Releya. 2011.

In addition to this text, the studentsalso have copies of:

Cunningham et al, *EnvironmentalScience – A Global Concern*, Canadian Edition, McGraw-HillRyerson, (2005) ISBN 0-07-091664-0 (see below)

http://highered.mcgraw-hill.com/sites/0070916640/information_center_view0/overview.html

Lopatka, Michael, *AP environmentalScience Lab Manual*, 1st ed, Awesome Guides Inc, ISBN0-

9723218-3-7

Additional information

This course makes extensive use of theMOODLE on line learning environment. MOODLE is used as a standard“course web site” with links, PowerPoints, solutions to problems,calendar etc but also provides some additional functions.

A required activity for the course isto participate in an on line discussion forum focussed on resourceuse analysis. Students choose an activity (such as driving to school)and are asked to analyze the energy and other resource use of thisactivity. Each student is expected to post their analysis and thenprovide constructive criticism for at least two other students’analyses. This activity allows students to develop their own ideasabout how to analyse a problem and then apply critical thinkingskills as they analyse and discuss other students’ work.

Students also contribute “environmentalliteracy summaries” where they are required to post a one sentencesummary of a topic, issue or person in environmental science andfollow this with a more detailed report. Other students are able toprovide constructive criticism and input.

The course also makes extensive use ofthe WebAssign&trademark; service. Eachtopic covered has an associated assignment based on the reading –approximately one chapter of the Cunningham textbook.

Text Contents – Cunningham et al – Canadian edition

Part One

Fundamental Principles of Ecology and Environmental Science

1. The Science of Our Environment
2. Environmental Ethics and Philosophy
3. Matter, Energy, and Life
4. The Dynamics of Populations
5. Factors controlling the distribution and abundance of organisms
6. Biomes

Part Two

Our Physical Environment

7. Geology

8. Air, Weather, and Climate

9. Air Pollution

10. Water

11. Water Quantity and Quality

12. Conventional Energy

13. New Energy Technologies

Part Three

Humans in the Environment

14. Food and Agriculture

15. Pest Control

16. Biodiversity

17. Land Use: Forests and Rangelands

18. Solid, Toxic, and Hazardous Waste

Part Four

Environmental Policy

19. Environmental Law: Its Role in Guiding Governing instruments

20. Environmental Health

21. Urbanization and Sustainable Cities

22. Preserving our Natural Environment

Unit information

Unit Name	Content and/or Skills Taught	Major assignments and/or assessments (text chapters)
1. Introduction	Intro to environmental Science, ethics and philosophy, science principles and methodologies	Chapter 1 and 2 WebAssigns(WA), Lorax essay, parable of the commons assignment
2. Background Science	Matter, Energy and life – food chains and webs, mineral (biogeochemical) cycles	Chapter 3 WA
3. Geology	Introduction to geology (time, rock cycle, tectonics)	Geology WA (7)
4. Ecology	Distribution and abundance of species, species interactions, productivity, succession	Ecology WA (5), ecological footprint assignment
5. Biomes	A survey of the world's major biomes	Biomes WA (6)
6. Human Population and population dynamics	Population dynamics and factors and human population history, demographics, demographic transition	Human population and pop dynamics (4) WA
7. Air weather and Climate	Structure and nature of the atmosphere, weather processes, circulation, climate, ENSO, Global warming, greenhouse effect, Climate change	Air weather and Climate (8) WA

8. Air Pollution	Acid deposition, ozone, indoor, particulates - control	Air pollution WA (9)
9. Water Pollution and use	Hydrologic cycle, water quality and quantity, types of water pollution, liquid waste management	Water pollution and water use WA (10 & 11)
10.Toxic waste	Solid waste, toxic waste, toxicity, waste disposal and management	Toxic waste (18) WA
11.pests and pesticides	History of pest control, pesticide types, problems, biological control and integrated pest management)	Pests and pesticides WA (15)
12.Energy	Conventional energy sources (coal, oil, gas, hydro, nuclear) New energy technologies (solar, conservation, fuel cells, wind, geothermal, tidal, OTEC)	Conventional energy WA, Alternative Energy WA (12&13) Energy use assignment
13.Land Use	Forests, rangelands	Land use WA (17)
14.Biodiversity issues	Measurement, threats, endangered species issues, protecting natural areas	Biodiversity WA (16) Endangered species project
15.Soil and agriculture	Soil composition, types and profiles, erosion, conservation. Agriculture	Soil WebAssign (14)
16.Environmental Law	Canadian, US and international legal mechanisms relating to environmental issues	Laws and regulations (19)
17.Review	Review of course content and practise with past exams	Past exam questions

Climate ChangeResources

Books:

Andrew Weaver: keeping our cool

Videos:

Inconvenient Truth

The great global warming swindle

Web Sites:

Climate wars – Gwynne Dyer:http://yappadingding.blogspot.ca/2007/03/climate-wars.html

Royal Society Climate change guide:http://royalsociety.org/uploadedFiles/Royal_Society_Content/News_and_Issues/Science_Issues/Climate_change/climate_facts_and_fictions.pdf

Royal Society – a summary of thescience:http://royalsociety.org/policy/publications/2010/climate-change-summary-science/

Seattle Times – truth about GlobalWarming:http://seattletimes.com/html/nationworld/2002549346_globewarm11.html

Pacific Institute for Climate Solutions– Climate Insights 101: http://www.youtube.com/PICSClimateInsights

PICS web site : http://pics.uvic.ca/

Laboratory Workand Field Trips

Field and laboratory experiences areconsidered to be an important part of this course. The followingdescribes some of the lab and field experiences covered in thiscourse.

Field work

Early in the year students participatein a 4 day field trip to Bamfield Marine Science Centre(http://www.bms.bc.ca/) where they are immersed in a West Coast marine environment. They aregiven approximately 25 hours of laboratory and field experienceduring this trip including laboratory sessions on marine invertebratediversity, experimental design, plankton and fieldwork involvingwater sampling and analysis in marine and estuarine environments,qualitative and quantitative analysis of rocky shore transects. Inaddition time is spent in forest environments looking at terrestrialdiversity, forest structure and ecology.

Two mid year field trips involve sitevisits to our local sanitary landfill(http://www.crd.bc.ca/waste/hartland/index.htm)(where students are exposed to the entire land filling process andlandfill design as well as the various waste reduction and recyclingschemes which are in place) and to the North saanich Wastewatertreatment plant (http://www.eocp.org/files/spwwtp.html)(where students are able to get a first hand understanding of theprocesses and issues involved in treating wastewater).

Long term class project

Aquarium project:

As a class project, we raise salmon aspart of the British Columbia “salmonids in the classroom”programme. This basically involves raising salmon from eggs to fryand then releasing these. This project runs from January until lateApril or May. As part of this project I expect the students tomonitor several aquatic environmental variables over the duration ofthe project including: pH, temperature, oxygen,ammonia/nitrate/nitrite and turbidity. They are also expected to doso using a number of different methods and also to use the samemethod several times so as to gain a sense of the repeatability andreliability of various techniques.

Laboratory Work

Collecting and recording weather data:

Students gather data on a number ofweather variables around the school: air pressure, temperature,humidity, wind speed, wind direction and monitor/analyse thesevariables over a week.

Soil structure lab:

Students work through soil section oflab #3 in lopatka manual

Biodiversity in leaf litter lab

Students use a Berlese funnel to studyorganisms in leaf litter. Biodiversity is calculated using theShannon Diversity index

Energy use activity:

For their energy use analysis, moststudents will have to find out the power consumption of varioushousehold devices. Students take home a WattsUp meter to measureactual power consumption of their devices. This data is used as thebasis for their calculations of overall energy consumption of theirchosen activity.

Air quality – particulate matter:

Students carry out lab #10 in Lopatkalab manual

Water quality testing

Students test various water samplesfrom around the school including a local stream, a local pond,aquarium water and tap water for a number of environmental variables.This is done as a “prelab” for the salmonid project.

Data analysis activities

Population and age structure activity:

Students work through lab #8 in Lopatkalab manual

Seismic wave analysis and earthquakelocation:

Students work through lab# 2 in Lopatkamanual