

## ENV 110 Course Outline

The following is an outline of the science content/concepts and science process topics addressed in the course, readings, and projects. Other points addressed in readings are reviewed in class discussions. Your studying should focus on the content summarized in the powerpoint files and your notes from our discussions of those slides, your notes about the main points made by the authors of our readings, and the science behind and outcomes from our projects.

### **Science Practices and Fisheries Basics**

#### Science Practices

- characteristics and intricacies of each; differences between (8)

#### Marine Life Info

- Marine habitats
- Marine lifestyles
- Trophic relationships
- Biodiversity

#### Fisheries intro

- Details about major fisheries activities and trends
- Be able to make sense of graphs and data used in class (including individual species studied)

#### Fish Id & Fish Collection Methods

- Fish found in our lake
- Possible methods to collect fish in freshwater systems
- What happens during electrofishing
- What is PSD and what does it tell us

#### Fish Info

- Different types of fish
- Why do we need protein and Omega fatty acids
- How does the nutritional value of the main proteins people eat compare
- Which fish are the best sources of Omega 3 fatty acids

#### Centennial Lake Background

- Characteristics of fish found in lake (see "Lake Fish List")
- Fishing regulations for the 5 species of fish found in Centennial Lake (see NJ fishing regulations in NJ Fisheries Resources page)
- Results of lake fish survey
- Recommendations to improve the lake system ("Lake fish survey-additional information" page); science behind recommendations

#### *Perfect Protein*

- main points made by author
- be able to consider these points with regard to other data provided

#### Main points from guest speakers

- public relations and managing public interest in research efforts;
- politics of managing fisheries and local fisheries management examples;
- decision making for an institution managing a natural resource

## Earth Basics

Mineral identification tests including distinctive properties

Mineral groups

Identify all minerals & rocks studied

Igneous rocks

- properties, names
- important rocks we studied

Plate types

- properties, differences, how they behave at plate margins

Plate margin types (5)...for each...

- types of plates involved
- relative motions of 2 plates involved
- phenomena that occur as a result of the motions between the 2 plates at all plate margin types
  - EQs (location and depths); volcanoes;
  - physiographic features (volcanoes, trenches, rift valleys in center of divergent margin; mountains)
  - spatial relationship between the above phenomena and features
- basics about sedimentary and metamorphic rock types
  - properties
  - names

[Don't be surprised to see some mineral and/or rock samples on the test!]

Sterling Hill Mine Intro

- Back Arc Basin geology basics
- Origin of hydrothermal vent deposits
- Geologic history of Sterling Hill ore in Franklin Marble
- Minerals fluorescence
- Information about Zinc & Manganese [extra handouts provided]

Sterling Hill tour and facts from tour as provided by Mine geologist's tour

Results of ore mapping exercise

Text:

- Important points from text discussed (*Extracted*)
- History of exploitation of minerals highlighted in text [including areas that have influenced our progress in extracting selected resources, current status, such as politic, economic, technological, other), and predicted future of mineral resources discussed in class [view others' note and add your own notes to: <https://titanpad.com/8mSKkKcVQf>]

## Water chemistry basics

Water molecule structure and special properties that result from the structure

Comparison of properties of different phases of H<sub>2</sub>O

Density

Process by which a solute is dissolved in a solvent

Skills to measure, and understanding water quality parameters, acceptable limits &/or various levels that impact life or water quality, and what controls each

- dissolved oxygen

- pH
- temperature
- TSS
- TDS
- DO
- BOD
- Nutrients

#### Biological processes

- biochemical processes that influence gas concentrations:
  - o Aerobic cellular respiration
  - o Photosynthesis
  - o Decomposition
- explain how each process individually can impact the chemistry in an aquatic ecosystem
- explain how the 3 processes *combined* can impact the water chemistry of an aquatic ecosystem
- either explain a data set provided or be able to predict impacts chemical changes if some properties of a water sample is provided to you

How a bioretention basin is supposed to work

#### **Basics about water resources**

Basic water cycle

Watershed

Where is all the water located on earth, where is the water we can access, and how much do we have?

Factors that affect water resources and our ability to access them

What are some of the "water crisis" issues?

How does the US use water?

What is the difference between a "green filter" set up and a "gray funnel" setup in terms of landuse?

How does an increase in development/urbanization (increase in impervious land surface) change the path rain water takes when it hits the earth surface?

What are the various ways an increase in impervious surface can impact the environment?

Where in the world are there highs for:

- impervious land surface
- impaired waters
- water supply stress
- average rainfall

What parts of the world are predicted to increase % of water withdrawal from total water available?

Are there any areas that are predicted to experience a decrease in withdrawal?

Surface water protection, storm water management, & potable water supplies (gues lecture)

- What are point source and non-point course pollutants?

- What did the 1972 Clean Water Act require of Americans?
- What are the issues with storm water?
- What are the numerous issues with non-point source pollutants?
- What are BMPs and what are some examples (and how do they work)?
- How does a bioretention basin work?
- What are some of the issues in extracting potable water?

Water Resources Data analyses (figures obtained by students) - when provided a diagram, summarize data included, interpret data using evidence to support your conclusions; comment on what author of *The Big Thirst* might have to say about the data.

Application of main points of *The Big Thirst* discussed in class