

EVPP 350 – Freshwater Ecosystems
Course Outline

- I. Properties of Water
 - A. Molecular Structure
 - B. Liquid Nature of Water
 - C. Density vs. Temperature
 - D. Specific Heat (heat capacity)
 - E. Viscosity
 - F. Surface Tension
 - G. Solvent Properties
- II. Global Hydrological Cycle and Importance of Freshwater Systems
 - A. Global Hydrologic Cycle Diagram
 - B. Extent and Turnover of Water Pools
 - C. Distribution of Freshwaters
- III. Hydrology
 - A. Watersheds
 - B. Water Movement at Watershed Level
 - C. Stream Networks and Stream Order
 - D. Patterns of Streamflow
 - 1. Precipitation
 - 2. Storm Hydrograph
 - 3. Effect of Various Factors on Storm Hydrograph
 - a. Watershed Size
 - b. Land Use/land cover
 - E. Annual Patterns in Stream Flow
 - 1. Watershed Size
 - 2. Geology/soils
 - F. Streamflow measurement
- IV. Stream Morphology
 - A. Longitudinal
 - 1. Large scale (multi-order patterns)
 - 2. Small scale (riffle/run/pool or step/pool)
 - B. Cross-sectional
 - 1. Low flow channel vs. Bank-full channel
 - 2. Flood plains
 - C. Channel features
 - 1. Particle sizes
 - 2. Coarse woody debris
 - 3. Instream and riparian vegetation
 - D. Habitat Assessment

V. Stream Chemistry

A. Suspended sediments

1. Overview
2. Particle size
3. Elements that bind to sediment
4. Factors affecting suspended sediment concentrations

B. Solutes

1. Overview
2. Atmospheric inputs
3. Weathering inputs
4. Biological processes
5. Composition of River Waters
 - a. World averages
 - b. Effect of rock type
 - c. Land use/human activity
6. Solute vs. sediment transport of elements
7. Spiraling
8. N and P cycles in flowing waters

C. Dissolved oxygen

1. Overview
2. Sources and sinks
3. Temporal patterns: seasonal and diurnal
4. Spatial patterns

D. pH, alkalinity, and hardness

1. Definition of pH
2. Carbonate-bicarbonate equilibrium
3. Definition of alkalinity
4. Definition of hardness

E. Temperature

1. Energy Budget
2. Temporal patterns
3. Spatial Factors