

Warren County School District
PLANNED INSTRUCTION

COURSE DESCRIPTION

Course Title: Aquatic Ecology

Course Number: 00365

Course Prerequisites: None

Course Description:

This course will study the complex interactions within the aquatic ecosystem. An emphasis will be placed on the identification and classification of Pennsylvania aquatic species. The basic principles of Aquatic resource management and protection as well as aquatic resource are also discussed. Students will develop skills in making informed decisions and taking constructive actions. Relevant lab activities will be incorporated throughout, utilizing scientific inquiry and appropriate technology.

Fall Semester Only

Suggested Grade Level: Grades 9-12

Length of Course: One Semester Two Semesters Other (Describe)

Units of Credit: .5 (Insert *None* if appropriate)

PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:
CSPG 32 - Biology

Certification verified by WCSD Human Resources Department: Yes No

TEXTBOOK AND SUPPLEMENTAL MATERIALS

Continue using Board approved textbook? Yes No (If yes, then complete the information below.)

Board Approved Textbooks, Software, Supplemental Materials:

Title:

Publisher:

ISBN #:

Copyright Date:

Date of WCSD Board Approval:

<http://www.envirothonpa.org/station/aquatic-ecology/>

The references are found on the PA Envirothon web site unless otherwise noted. New items are underlined. The references are also available on the Commission's Learning Center page for Envirothon.

1. Books:

Pennsylvania Fishes

Pennsylvania Amphibians and Reptiles (ISBN 1-930369-00X)*

*The Pennsylvania Amphibians and Reptiles book is not available electronically. New teams should contact their County Conservation District to obtain a copy of this book.

2. Fact Sheets

A River Flows Through It

Basics of Water Pollution

Caddis Flies

Clams and Mussels

Crazy Crayfish

Dobsonfly

Dragons and Damsels

ENA and ELPA

Macroinvertebrate Feeding Frenzy

Mayflies

Phytoplankton

Pond/Stream Study Guide & Key to Macroinvertebrates

Snails

Stoneflies

Stream Reader

Water Walkers

Zooplankton

3. PLAY Issues and Select PLAY

Focus on Habitat: Largemouth Bass

Focus on Habitat: Wild Brook Trout

Freaky Fish of PA

Good Fishing Needs Good Habitat

PA's Most Mighty Migratory Fish

Pennsylvania FSI: Fish Scene Investigation

Six Legs Underwater

Six Ways to the Sea

Watersheds and Stream Order

4. Articles

A Fish and Livestock Tale

Ghosts of the Ohio River

PA's Threatened and Endangered Fishes

PA's Wild Trout Streams

State Wildlife Action Plan

– Identifying Threats to PA's At Risk Aquatic Species

– Identifying Conservation Actions to Protect PA's At-Risk Species

– A lifeline for the Commonwealth's Imperiled Species

Timbering and Trout

The Water Cycle, A Quick Summary (USGS)

Wetlands: The Vital Link

5. 2018 Pennsylvania Summary of Fishing Laws and Regulations

The summary book will be available on the Fish page of the Pennsylvania Fish and Boat Commission's website in January 2018. Teams should review the following regulations or information (in order as they appear in the Summary):

- General Fishing Regulations, Tackle and Bait
- Unlawful Acts
- All Fish Species – Inland Waters
- Largemouth, Smallmouth, Spotted Bass
- Pymatuning and Conowingo Reservoirs
- Delaware River Fishing
- Lake Erie Fishing
- Muskellunge, Pike, Pickerel & Panfish
- Reptiles, Amphibians, Endangered Species
- Aquatic Invasive Species
- Trout Fishing Regulations
- Special Regulations Areas

6. Frog and Toad Calls of Pennsylvania (New teams should contact the County Envirothon Coordinator to obtain their copy of this CD.)

7. Herp Sweet Home

8. Threatened & Endangered Species

- Current List of PA's Endangered, Threatened, and Candidate Species
- Endangered Species and the PA Fish Boat Commission
- Poster of PA's Threatened & Endangered Species*

Participants are responsible for identification of each of the given animals in addition to knowing the information under *Objective 2c*.

Invertebrates

Clubshell Mussel

Dwarf Wedgemussel

Eastern Pearlshell Mussel

Fish

Atlantic Sturgeon

Burbot

Hickory Shad

Longear Sunfish

Spotted Gar

Amphibians & Reptiles

Eastern Spadefoot Toad

Northern Cricket Frog

Green Salamander

Eastern Redbelly Turtle
Eastern Massasauga Rattlesnake

9. Pennsylvania Field Guide to Aquatic Invasive Species (AIS) – PA Sea Grant

- Introduction
- Prevention
- Species Pages*

Participants are responsible for identification of each of the given plants and animals in addition to knowing the information under *Objective 2d*.

PLANTS	INVERTEBRATES	FISH	ALGAE	REPTILES
Eurasian watermilfoil	Asian Clam	Common Carp	Didymo	Red-eared Slider
Hydrilla	New Zealand Mudsnaill	Flathead Catfish		
Water Chestnut	Rusty Crayfish	Northern Snakehead		
Common Reed	Spiny water flea	Round Goby		
Purple Loosetrife	Zebra Mussel	Sea Lamprey		

Northwest Region – 11528 State Highway 98, Meadville PA 16335, 814-336-2426

Southwest Region – 236 Lake Road Somerset PA 15501-1644, 814-443-9841

Northcentral Region – 450 Robinson Lane Bellefonte PA 16823, 814-359-5127

Southcentral Region – 1704 Pine Road, Newville, PA 17241, 717-486-7352

Southeast Region – 101 Swamp Road, Newtown, PA 18940, 215-968-9081

Northeast Region – 5566 Main Road, Sweet Valley PA 18656, 570-477-2206

BOARD APPROVAL:

Date Written: 2/28/18

Date Approved: _____

Implementation Date: 2018-2019

SPECIAL EDUCATION AND GIFTED REQUIREMENTS

The teacher shall make appropriate modification to instruction and assessment based on a student's Individual Education Plan (IEP) or Gifted Individual Education Plan (GIEP).

COURSE OVERVIEW

(List the content to be taught)

I. Aquatic Ecology

a. Abiotic

1. Influence of water's chemical properties on aquatic organisms
2. Influence of water's physical properties on aquatic organisms
3. Influence of the surrounding land on a stream
4. Influence of the water cycle on the aquatic ecosystem
5. Identification of watersheds and river systems in Pennsylvania
6. Identification and comparison of stream order within a watershed

b. Biotic

1. Identification of aquatic organisms
2. Life cycles of aquatic organisms
3. Adaptations of aquatic organisms
4. Habitat needs of aquatic organisms

c. Community

1. Identification of aquatic and wetland environments
2. Functions and values of wetlands
3. Physical, chemical, and biological changes in the stream continuum
4. Functional feeding groups of aquatic organisms and their niche in the stream continuum
5. Energy flow in aquatic food chains

II. Aquatic Resource Issues

1. Human effects on the aquatic ecosystem
2. Impact of water pollution on aquatic communities
3. Threatened and endangered species and their impact on biodiversity
4. Introduced and invasive species and their effects on the aquatic ecosystem

III. Aquatic Resource Management and Protection

1. Commission roles in management, conservation and protection of aquatic resources
2. Regulations and how they protect aquatic animals and aquatic habitats
3. Water quality assessment
4. Water quality improvement
5. Aquatic habitat enhancement
6. Restoration of aquatic organisms
7. Aquatic resource protection at home and school

ANCHORS AND STANDARDS

*Correlated with the Academic Standards for Environment and Ecology.

After completing study on this issue, students will:

1. Aquatic Ecosystems

a. Abiotic

1. Determine pH, alkalinity, and dissolved oxygen percent saturation of a water sample with given information and explain how each property influences a particular aquatic organism.
**4.1 Ecology – 4.1.12.F*4.2 Watersheds and Wetlands – 4.2.10.A, B, C, D, 4.2.12.B, C, D*
2. Explain how water flow, water temperature, water turbidity, and surface tension influence a particular aquatic organism.
**4.2 Watersheds and Wetlands – 4.2.10.A, B, C, 4.2.12.C, D*
3. Explain how surrounding land influences water flow, channel shape and habitat types in a stream.
**4.2 Watersheds and Wetlands – 4.2.10.A, B, 4.2.12.A*
4. Identify three specific parts of the water cycle and describe their influence on the aquatic ecosystem.
**4.2 Watersheds and Wetlands – 4.2.10.A, B*
5. Identify Pennsylvania's six watersheds and their related river systems and locate them on a map.
**4.2. Watersheds and Wetlands – 4.2.10.A*
6. Identify the stream order of three or more given watercourses in a particular watershed and compare or contrast the habitats and aquatic animals that are found in each of those ordered watercourses.
**4.2 Watersheds and Wetlands – 4.2.10.A*

b. Biotic

1. Identify (to include calls) common and significant aquatic animals from a given identification list.
**4.2 Watersheds and Wetlands – 4.2.10.C*
2. Describe the life cycle of three or more specific aquatic organisms
**4.2 Watersheds and Wetlands – 4.2.10.C*
3. List three adaptations of a specific aquatic animal and explain the advantage of each.
**4.1 Ecology – 4.1.10.D*4.2 Watersheds and Wetlands – 4.2.10.A, C*
4. Describe the habitat needs of three or more specific aquatic animals.
**4.2 Watersheds and Wetlands – 4.2.10.C*

c. Community

1. Identify six specific aquatic or wetland environments given their physical, chemical, and biological characteristics.
**4.2 Watersheds and Wetlands – 4.2.10.B, D*
2. List three functions or values of wetlands.
**4.2 Watersheds and Wetlands – 4.2.7.B*
3. Compare and contrast a physical, chemical, and biological difference found in a stream continuum from headwater to mouth.
**4.2 Watersheds and Wetlands – 4.2.10.A, C, D, 4.2.12.D*
4. Identify the functional feeding group of four or more aquatic macroinvertebrates and describe their niche in the stream continuum.
**4.2 Watersheds and Wetlands – 4.2.10.C*
5. Compare and contrast the flow of energy in two different aquatic food chains.
**4.1 Ecology – 4.1.7.A, 4.1.10.A*

2. Aquatic Resource Issues

- a. Explain the effects of three different human activities on the aquatic ecosystem.
**4.2 Watersheds and Wetlands – 4.2.10.A, B, D, 4.2.12.A, C*4.5 Humans and the Environment – 4.3.7.B, 4.3.10.B*
- b. List three types of water pollution, their sources, and explain how they impact an aquatic community.
**4.2 Watersheds and Wetlands – 4.2.10.A*4.5 Humans and the Environment – 4.5.10.A, C*
- c. Identify at least six threatened or endangered species, give reasons for their status, and explain how their extirpation or extinction could impact biodiversity.
**4.1 Ecology – 4.1.10.A, D, E, 4.1.12. D, E, F*
- d. Identify at least six different invasive species and discuss their habitat, spread, distribution and environmental impacts.
**4.1 Watersheds and Wetlands – 4.2.10.C*

3. Aquatic Resource Management and Protection

- a. Explain three or more ways that the Commission manages, conserves, and protects aquatic resources.
**4.2 Watersheds and Wetlands – 4.2.12.A, B, C*4.5 Humans and the Environment – 4.5.12.C*
- b. Identify or list at least three specific fishing regulations from the current PA Fishing Summary and explain how each protects aquatic animals or aquatic habitats.
**4.1 Ecology – 4.1.12.A, E*
- c. Explain one or more methods to assess the water quality of a stream.
**4.2 Watersheds and Wetlands – 4.2.10.A, C, D*
- d. List and describe three or more ways to improve the water quality of a stream.
**4.2 Watersheds and Wetlands – 4.2.10.C*
- e. List and describe three or more ways to enhance aquatic habitats.
**4.2 Watersheds and Wetlands – 4.2.10.D, 4.2.12.D*

f. Identify three or more migratory fish that the Commission is restoring and name the watershed in which each can be found.

**4.1 Ecology – 4.1.12.E*

g. Discuss at least three ways that you can protect aquatic resources at home or school.

**4.1 Ecology – 4.1.10.D, E, 4.1.12.D, E*4.5 Humans and the Environment*

CC.3.5.9-12 Reading informational Text

CC.3.6.9-12 Writing

ASSESSMENT

Portfolio Assessment: Yes No

District-Wide Common Final Examination Required: Yes No

Course Challenge Assessment (Describe): Must pass the final examination with a minimum of an 80%.

WRITING TEAM: Warren County School District Teachers

WCSD STUDENT DATA SYSTEM INFORMATION

1. Is there a required final examination? Yes No
**Warren County School District Policy 9741 and 9744 state, "All classes in grades 9-12 shall have a final exam."*
2. Does this course issue a mark/grade for the report card? Yes No
3. Does this course issue a Pass/Fail mark? Yes No
4. Is the course mark/grade part of the GPA calculation? Yes No
5. Is the course eligible for Honor Roll calculation? Yes No
6. What is the academic weight of the course?
 No weight/Non credit Standard weight Enhanced weight