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## ABSTRACT

Presented is an outline of a basic course (low level) in biology for students whose interest and background are very limited. The study and dissection of earthworm, crayfish, perch, and bird are included. A detailed study of the frog is undertaken as a representative of the animal kingdom. Performance objectives are presented, as well as a course outline based on a phylogenetic approach to the zoology course. A master sheet lists the objectives by number and itemizes the various texts involved with specific chapters noted. Laboratory activities, demonstrations, projects, suggested reports, field trips, films and film loops, as well as other curriculum events corresponding to each objective are included. Suggested innovative activities and additional references are also provided. (EB)

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SE

**AUTHORIZED COURSE OF INSTRUCTION FOR THE** **QUINMESTER PROGRAM**



**ANIMALS FROM THE OUTSIDE IN**

**5314.01**

**SCIENCE**

**(Experimental)**

**DADE COUNTY PUBLIC SCHOOLS**

**DIVISION OF INSTRUCTION • 1971**

SE 016 515

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ANIMALS FROM THE OUTSIDE IN

5314.01

SCIENCE

(Experimental)

Written by David Z. Kleinman  
for the  
DIVISION OF INSTRUCTION  
Dade County Public Schools  
Miami, Florida  
1972

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## ANIMALS FROM THE OUTSIDE IN

### COURSE DESCRIPTION

An elective low level course in introductory Biology. It is the study and dissection of common animals such as the earthworm, crayfish, perch, and bird. The course offers a detailed study of the frog as the main representative of the animal kingdom.

### ENROLLMENT GUIDELINES

This is a basic course in biology for students whose interest and background in science is very limited.

### STATE ADOPTED TEXTS

1. Biological Sciences Curriculum Study. High School Biology Green Version 2nd ed. Chicago: Rand McNally, 1968
2. Biological Sciences Curriculum Study. Patterns and Processes. New York: Holt, Rinehart and Winston, 1966.
3. Brandwein, Paul F.; Burnett, R. Will; and Stollberg, Robert. Life its Forms and Changes. New York: Harcourt, Brace and World, 1968.
4. Oxenhorn, Joseph M., and Idelson, Abraham. Pathways in Science. Biology 1. New York: Glove Book Company, Inc., 1968.
5. Oxenhorn, Joseph M., and Idelson, Abraham. Pathways in Science. Biology 2. New York: Glove Book Company, Inc., 1968.
6. Oxenhorn, Joseph M., and Idelson, Abraham. Pathways in Science. Biology 3. New York: Glove Bork Company, Inc., 1966.
7. Smallwood, William, and Green, Edith. Biology. Morriston, New Jersey: Silver Burdett Company, 1971.
8. Thurber, Walter A., and Kilburn, Robert A. Exploring Life Science. Boston: Allyn and Bacon, Inc., 1966.

## PERFORMANCE OBJECTIVES

1. The student will demonstrate the scientific method by performing a controlled experiment.
2. The student will differentiate between vertebrates and invertebrates.
3. The student will identify one edible mollusk, arthropod, fish, bird, reptile or mammal.
4. The student will describe how to obtain information about any animal studied in the course from local, state, and federal agencies.
5. The student will dissect either a vertebrate or an invertebrate.
6. The student will compare similarities and differences between frogs and humans.
7. The student will identify various insect eating birds.
8. Given selected species which are in danger of extinction the student will propose possible causes.

## COURSE OUTLINE

- I. Characteristics of Animals
  - A. Movement
  - B. Consumers of energy
  - C. Producers of CO<sub>2</sub>
- II. How Animals are Grouped
  - A. Protozoa
    1. Disease producers
    2. Scavengers

COURSE OUTLINE (Continued)

B. Animals without backbones

1. Earthworms

- a. Food source
- b. Soil conditioners
- c. Dissection of an earthworm

2. Insects

- a. Economic value
  - (1) Pollination
  - (2) Diseases
- b. Grasshopper as a representative insect

3. Mollusks, crustaceans and the seafood industry

- a. Clams
- b. Snails
- c. Squid and octopus
- d. Shrimp, crabs and lobsters
- e. Dissection of a crayfish

C. Animals with backbones

1. Fish

- a. Sport fish
- b. Freshwater pollution and fish
- c. Fish and mosquito control
- d. Fish dissection

2. Amphibians

- a. Toads
- b. Salamanders

3. Other vertebrates

- a. Reptiles
  - (1) Poisonous snakes in Florida
  - (2) Turtles
  - (3) The endangered alligator

COURSE OUTLINE (Continued)

b. Birds

- (1) Insect control
- (2) Endangered species

c. Mammals

- (1) Familiar mammals
- (2) Wild mammals
- (3) Endangered mammals

III. The Frog as a Representative Animal

A. Two lives for the price of one

1. The frog in the water
2. The frog on land

B. The frog dissection

1. External structures
  - a. Amphibious adaptations
  - b. Skin circulation
2. Superficial muscles
  - a. Composition
  - b. Function
3. Internal organs
  - a. Function
  - b. Similarity to human organs
4. The circulatory system
  - a. Three chambered heart
  - b. Large blood vessels
5. The skeletal system
  - a. Important structures
  - b. Similarity to human
6. The brain and central nervous system
  - a. Reaction to stimuli
  - b. Similarity to other animals

## LABORATORY EXPERIMENTS

Brandwein, Paul; Burnett, R. Will; and Stollberg, Robert. Life, Its Forms and Changes. New York: Harcourt, Brace and World, Inc., 1968.

1. The Frog (pp. 97-103)
2. Variety in the Protozoans (p. 311)
3. The Amoeba (p. 313)
4. The Earthworm (pp. 344-346)
5. The Grasshopper (pp. 356-359)
6. The Fish (pp. 379-384)
7. The Development of the Frog (pp. 388-389)
8. The Anatomy of a Bird (a chicken) (pp. 406-408)

Otto, James; Towle, Albert; and Crider, Elizabeth. Biology Investigations. New York: Holt, Rinehart and Winston, Inc., 1965.

9. Study of Cells (exp. 4-1, p. 33)
10. Variation in Cell Structure (exp. 4-2, p. 35)
11. Principles of Diffusion (exp. 5-1, p. 37)
12. Porifera the Sponges (exp. 27-1, p. 237)
13. The Earthworm (exp. 28-3, p. 251)
14. Mollusca (exp. 29-1, p. 257)
15. The Crustaceans (exp. 30-1, p. 261)
16. The Grasshopper (exp. 31-1, p. 267)
17. External Structure of the Frog (exp. 35-1, p. 281)
18. Dissection of the Frog (exp. 35-2, p. 281)

Green, Edna R., and Bobrowsky, Kenneth. Laboratory Investigations in Biology. Morristown, New Jersey: Silver-Burdett Company, 1971.

19. The Earthworm (exp. 23, p. 91)
20. The Grasshopper (exp. 24, p. 97)
21. The Frog (exp. 25, p. 103)
22. Fertilization of Frog Eggs (exp. 41, p. 175)
23. Early Development of the Embryo (exp. 42, p. 179)

Thurber, Walter A. and Kilburn, Robert E. Exploring Life Science. Boston: Allyn and Bacon Inc., 1966.

24. Analyzing a Community (pp. 30-33)
25. Hardiness of Seeds (p. 94)
26. Experimental Research (p. 107, #1 and 2)

## LABORATORY EXPERIMENTS (Continued)

Curriculum Bulletin 8F Biology. Miami, Florida: Dade County Public Schools, 1969.

This is an excellent reference with many activities for the terminal student.

## DEMONSTRATIONS

1. To demonstrate the effects of DDT or other water pollutants;
  - a. Set up two ten gallon fish tanks with several goldfish.
  - b. Put the polluting agent in one and not the other.
  - c. Be sure to remove the fish before they die.
2. To demonstrate the need for fish as mosquito control agents;
  - a. Collect mosquito wigglers from a stagnant puddle.
  - b. Place them in a tank with gambusia or goldfish.

## PROJECTS

1. Have students present recipes and methods for the cleaning and cooking the following:
  1. Clams
  2. Snails
  3. Crayfish
  4. Lobsters
  5. Turtles
  6. A sport fish (Bass, Trout or Bluegill)
  7. Octopus
  8. Frog's legs
  9. Crabs
  10. Shrimp

Optional: If it is possible, have students prepare and serve samples to the class.

## PROJECTS (Continued)

2. Have the students mount and label the bones of a frog or any other animal studied during this course. (Optional) Use a "plastic man" model to compare the skeleton of the frog (or other animal) to the human.
3. Make a notebook or poster of 10 animals which are considered to be in danger of extinction.

## REPORTS

1. The effect of the Red Tide on fishing in Florida waters.
2. The effects of fertilizer run off on Lake Apopka and Lake Okeechobee. Tell how eutrophication has effected sport fishing in the two lakes.
3. The cycle of malaria, try to determine the reason we have so few cases in the United States.
4. Read Silent Spring by Rachael Carson and report on her findings about biological controls of insects.
5. Alligator poaching in Florida and why the hides are so important.
6. Florida's unusual animals such as:
  - a. The poison toad
  - b. Sea cow
  - c. The flamingo
  - d. The key deer
  - e. Walking catfish

### FIELD TRIPS

1. Take a fishing trip to a nearby canal or lake; use cane poles; try to identify the fish caught. See how many types of birds, insects and mammals can be identified.
2. Crandon Park Zoo  
Key Biscayne - Telephone: 361-5421
3. Everglades National Park  
Telephone: 247-6211
4. Monkey Jungle  
14805 S. W. 216 Street  
Telephone: 235-1611
5. Parrot Jungle  
11100 S. Red Road (SW 57 Avenue)  
Telephone: 361-3636
6. Seaquarium  
Rickenbacker Causeway  
Telephone: 361-5703
7. Serpentarium  
12655 South Dixie Highway  
Telephone: 235-5722

### SPEAKERS

1. Speakers on Conservation and Marine Resources, write to:  

Environmental Science Service Administration  
901 South Miami Avenue  
Miami, Florida
2. Speakers on Marine and Atmospheric Sciences, write to:  

Rosenstiel School of Marine and Atmospheric Science  
University of Miami  
Rickenbacker Causeway  
Miami, Florida 33149

SPEAKERS (Continued)

For Other Speakers on Related Subjects, write or call:

3. South Florida Veterinary Association  
Dr. Eli Gersten  
6100 South Dixie Highway  
Miami Telephone: 667-7238
4. Tropical Audubon Society  
Mrs. Flora O'Brien  
4440 W. Flagler  
Miami
5. Everglades National Park  
P. O. Box 269  
Homestead, Florida  
Telephone: 247-6211

FILMS - FROM DADE COUNTY PUBLIC SCHOOLS AUDIOVISUAL CENTER

1. The Living Soil  
AV # 1-14066, 20 min., C.
2. Rival World  
AV # 1-31402, 27 min. C.
3. The River Must Live  
AV # 1-14067, 21 min., C.
4. Scientific Method  
AV # 1-00183, 11 min., C.
5. Scientific Method in Action  
AV # 1-10079, 19 min., C.
6. Characteristics of Plants and Animals  
AV # 1-30539, 28 min., C.
7. Micro Organisms: Beneficial Activities  
AV # 1-11358, 15 min., C.
8. Micro Organisms: Harmful Activities  
AV # 1-11358, 15 min., C.
9. Earthworm  
AV # 1-02734 and 1-02735, 10 min. ea., C.

FILMS - FROM DADE COUNTY PUBLIC SCHOOLS AUDIOVISUAL CENTER (Continued)

10. Mollusks  
AV # 1-11149, 14 min., C.
11. Insect Life Cycle  
AV # 1-02787, 11 min., C.
12. Fish and Their Characteristics  
AV # 1-02831, 11 min., C.
13. Frogs and Toads  
AV # 1-02849, 10 min., C.
14. Frogs  
AV # 1-02845, 10 min., C.
15. Life Cycle of a Frog  
AV # 1-02852, 11 min., C.
16. Life Cycle of a Frog  
AV # 1-02790, 11 min., B/W
17. Frog Anatomy  
AV # 1-11182, 17 min., C.
18. Amphibians  
AV # 1-02824, 11 min., C.
19. Introducing the Reptiles  
AV # 1-11183, 17 min., B/W
20. Reptile  
AV # 1-11186, 15 min., C.
21. Dinosaur (Aibs)  
AV # 1-30673, 27 min., C.
22. Reptiles and Their Characteristics  
AV # 1-02865, 11 min., C.
23. Bird Community  
AV # 1-02904, 12 min., C.
24. Birds of the Florida Marsh  
AV # 1-11196, 14 min., C.
25. Natures Birds of Prey  
AV # 1-30710, 30 min., C.

FILMS - FROM DADE COUNTY PUBLIC SCHOOLS AUDIOVISUAL CENTER (Continued)

26. Birds and Their Characteristics  
AV # 1-02892, 11 min., C.
27. Water Birds  
AV # 1-02995, 12 min., C.
28. Big Animals of Africa  
AV # 1-02386, 11 min., C.
29. Big Animals of North America  
AV # 1-02383, 11 min., C.

FILM LOOPS

The following are available from:

Ward's Natural Science Establishment  
P. O. Box 712  
Rochester, New York 14603  
(1970-1971 Catalog Supplement)

1. Octopus  
73W1912, \$19.95, 2 min., & 2 sec.
2. Protozoans  
73W1951, \$19.95, 3 min., & 57 sec.
3. Clam  
73W1910, \$19.95, 2 min., & 16 sec.
4. Crayfish  
73W1942, \$19.95, 2 min., & 33 sec.
5. Mosquito Life Cycle  
73W1890, \$19.95, 4 min., & 30 sec.
6. Earthworm  
73W1916, \$19.95, 3 min., & 8 sec.
7. Frog Heartbeat I  
73W1721, \$19.95, 3 min., & 45 sec.
8. Frog Heartbeat II  
73W1722, \$19.95, 4 min., & 55 sec.

FILM LOOPS (Continued)

9. Frog Anatomy External and Oral  
73W1738, \$19.95, 4 min., & 30 sec.
10. Frog Skeletal System  
73W1739, \$19.95, 4 min., & 30 sec.
11. Frog Muscular System  
73W1740, \$19.95, 4 min., & 30 sec.
12. Frog Digestive System  
73W1741, \$19.95, 4 min.
13. Frog Respiratory System  
73W1742, \$19.95, 4 min.
14. Frog Circulatory System  
73W1744, \$19.95, 4 min., & 50 sec.
15. Frog Urogenital System  
73W1743, \$19.95, 4 min.
16. Frog Nervous System  
73W1745, \$19.95, 4 min.

PRESERVED MATERIAL FOR DISSECTION AVAILABLE FROM WARD'S

1. Earthworms  
60W2200, \$17.00 per hundred.
2. Crayfish  
60W2810, \$18.00 per hundred.
3. Grasshoppers  
60W4150, \$12.00 per hundred.
4. Yellow Perch  
61W1551, \$150.00 per hundred.
5. Frogs  
61W2342, \$288.00 per hundred.
6. Turtle  
61W3340, \$160.00 per hundred.
7. Pigeons (Similar to Chicken)  
61W4472, \$300.00 per hundred.

### LIVING MATERIALS AVAILABLE FROM WARD'S

1. Amoeba Proteus  
87W0390, \$3.00 per class unit.
2. Mixed Protozoa  
87W1500, \$3.50 per class unit.
3. Mixed Pond Protozoa  
87W1510, \$3.50 per class set.
4. High School Protozoa Set  
87W1550, \$9.00 per class set.

### DISCUSSION QUESTIONS

1. List five similarities and five differences between vertebrates and invertebrates.
2. Describe the life cycles of three parasitic invertebrates and give methods for protecting people from being infected by them.
3. Why should all meat, and especially pork, be thoroughly cooked?
4. What is the main disadvantage of deep-frying food at high temperatures for a long time?
5. Name one distinguishing characteristic for each of the groups listed below.
  - a. Arthropods
  - b. Flatworms
  - c. Fishes
  - d. Amphibians
  - e. Reptiles
  - f. Birds
  - g. Mammals
  - h. Primates

ADDITIONAL INNOVATIVE ACTIVITY

Instructions to the student:

1. The letters below contain the names of many familiar animals.
2. Circle as many words as you can find. They are written forward, backward, up, down and diagonally.
3. As you find the words, write them in the column at the side of the page.
4. Circle all the words you find, but write them only once.
5. Write one word on each line in the column at the side of the page.
6. All the words must have five or more letters.
7. Define or describe all the words you find on the back of this page.

V S H A R K B S C D E K A N S

1. \_\_\_\_\_

G E O A E L E P H A N T F P H

2. \_\_\_\_\_

H K R R L M N I E P Q R O R U

3. \_\_\_\_\_

J Z S T Y X W D V A T N S I M

4. \_\_\_\_\_

N R E H E W X E B C G G H M A

5. \_\_\_\_\_

A S T R V B Y R D E F L J A N

6. \_\_\_\_\_

E T M O Z W R O B I N K E T M

7. \_\_\_\_\_

C U H P J X E A B C D F G E A

8. \_\_\_\_\_

A O E O P N P N T M K B L H N

9. \_\_\_\_\_

T R P C Q O T I G E R S T K A

10. \_\_\_\_\_

S T O R B I N S E C T P L T

11. \_\_\_\_\_

U P N M L B L V A R T S N M E

12. \_\_\_\_\_

R K L P Q I E M O N K E Y N E

13. \_\_\_\_\_

C J M N R G M R O W D N O R

14. \_\_\_\_\_

F L A T W O R M H G F D C B M

15. \_\_\_\_\_

ADDITIONAL INNOVATIVE ACTIVITY (Continued)

Teachers Answer Key

- |               |              |           |
|---------------|--------------|-----------|
| 1. Vertebrate | 16. Coral    | 16. _____ |
| 2. Crustacean | 17. Heron    | 17. _____ |
| 3. Arthropod  | 18. Trout    | 18. _____ |
| 4. Reptile    | 19. Shark    | 19. _____ |
| 5. Sponge     | 20. Brean    | 20. _____ |
| 6. Insect     | 21. Monkey   | 21. _____ |
| 7. Roundworm  | 22. Gibbon   | 22. _____ |
| 8. Flatworm   | 23. Horse    | 23. _____ |
| 9. Mollusk    | 24. Tiger    | 24. _____ |
| 10. Octopus   | 25. Human    | 25. _____ |
| 11. Amphibian | 26. Elephant |           |
| 12. Turtle    | 27. Manatee  |           |
| 13. Snake     | 28. Primate  |           |
| 14. Eagle     | 29. Amoeba   |           |
| 15. Robin     | 30. Spider   |           |

REFERENCES

1. Available from Esso Chemical Inter-America  
396 Alhambra Circle  
Coral Gables, Florida 33134
  1. Cultivator
  2. Insects
11. Available from the Florida Department of Agriculture, Tallahassee, Fla.
  3. Ants in the Home & Garden, Home & Garden Bulletin #28
  4. Control of Caterpillars, Farm Bulletin 2099
  5. Commercial Vegetable Insect and Disease Control Guide, Circular 193 F
  6. Florida Bee Keeping, Bulletin 10
  7. Florida Rocket Gopher, Circular 310

REFERENCES (Continued)

8. Mole Control, Circular 248
9. Screw Worms and Their Control, Circular 107
- III. Available from the Audubon Society  
1130 5th Avenue  
New York, New York 10028
10. Audubon Society Nature Bulletin Life in a Pond, 20¢
11. Bird Migration Map
12. Lets Explore a Backyard (NB3 & 7)
- IV. Available from the Florida Game and Freshwater Fish Commission  
South Gadsen Street  
Tallahassee, Florida
13. Animal Tracks
14. Facts for Florida Fishermen
15. Florida's Game Animals
- V. Available from the National Wildlife Federation  
1412 N. W. 16 Street  
Washington, D.C. 20036
16. Wildlife of Coastal Waters
17. Wildlife of Farm and Field
18. Wildlife of Forests and Range Lands
19. Wildlife of Lakes, Streams and Marshes
- VI. Available from Publishers Listed.
20. Davis, Adelle. Lets Cook it Right. New York: Signet Books, 1969.
21. Davis, Adella. Lets Eat Right to Keep Fit. New York: Signet Books, 1970.
22. Engel, Leonard. The Sea. Life Nature Library Series. New York: Time Life Inc., 1969.

REFERENCES (Continued)

23. Reid, George K.; Zim, Herbert S. and Fichter, George S. Pond Life. New York: Golden Press, 1967.
24. Stephens, William M. Southern Seashores. New York: Holiday House, 1968.
25. Swain, Suzan N. Insects and their World. Garden City, New York: Garden City Books, 1955.
26. Zim, Herbert S. and Cottam, Clarence. Insects. New York: Golden Press, 1956.
27. Zim, Herbert S. and Gabrielson, Ira H. Birds. New York: Golden Press, 1949.
28. Zim, Herbert S. and Hoffmeister, Donald F. Mammals. New York: Golden Press, 1955.
29. Zim, Herbert S. and Ingle, Lester. Seashores. New York: Golden Press, 1955.
30. Zim, Herbert S. and Shoemaker, Hurst H. Fishes. New York: Golden Press, 1955.
31. Zim, Herbert S. and Smith, Hobart M. Reptiles and Amphibians. New York: Golden Press, 1953.

MASTER SHEET - ANIMALS FROM THE OUTSIDE IN

Objectives	Texts	Labs	Demonstrations	Projects	Reports	Field Trips	Speakers	Films	Film Loops	Discussion Questions	Additional Activities	References
1	#8 Ch. 1 #1 Ch. 1 #7 Ch. 1 #2 Ch. 1 #4 Unit 1	2,7 11,22,23 24,25,26	1,2		3,4		1,2,3	4,5, 22		4		9
2	#8 pp. 401-432 #1 Ch. 4,6 #3 Ch. 14,15 #6 Unit 1	2 1,3,4,5, 6 12,9,10	2	1			3,4,5	1,2 6,12,13 15		1,2		23,29
3	#1 Ch. 7,8 #3 Ch. 14,15, 16 #6 Unit III	5,8,14 17,18 15,16		1 3		1,2,3 4,5,6 7	4,5	14,19, 20	1,3,4	3,4	1	16,17,18,19, 20,21,22,23,24, 29,31
4					1,2,5, 6	2,3,4	1,2,3, 4,5					I, II, III, IV, V, VI
5	#3 Ch. 5,14 Ch. 15,16	1,4,5,6,C 13,17,18, 19,20,21		2			3,4	9,17	7,8,9, 10,11, 12,13, 14,15, 16			
6	#3 Ch. 5 #2 pp. 257 to 270 #8 pp. 401-432	1,17,18, 21		1,2			3,5	9,17, 18	10,11 12,13 14,15	5		28
7	#1 Ch. 7,8,10 #3 Ch. 16	8		3		1,5	1,2,4	23,24, 25,26, 27	5		1	23,24,27,29
8	#1 Ch. 10,18, 20 #3 Ch. 20 #8 pp. 453-464		1,2	3	1,2, 4,5	3,5	1,4,5	23,24, 25,27, 28,29				10,11,12,16,17,19, 24,27,28,29