SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: AQUATIC SURVEYS

CODE NO.: FOR 328-4 SEMESTER: VI(F&W) III(WRT)

PROGRAM: FISH & WILDLIFE/WATER RESOURCES

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DATE: JULY 1993 PREVIOUS OUTLINE DATED: SEPTEMBER 1992

APPROVED: _____ July 21/93.
DEAN DATE

AQUATIC SURVEYS — FOR 328-4

COURSE NAME — COURSE NUMBER

PREQUISITE(S): BIO125 (Water Resources)

CREDIT HOURS: 64

I. PHILOSOPHY/GOALS:

A field course designed to provide a practical evaluation of physical, chemical and biological parameters of lake and stream ecosystems.

Students will produce a depth contour map based on echo sounding conducted in the field, a physical features map and a gradient profile map.

Gill nets, trap nets and electroshockers will be utilized to assess fish species present.

Proper handling and processing of fish will be practiced, as well as the removal and preparation of structures for age determination.

The purpose, procedure and data analysis for a creel census will be considered and an effort will be made to conduct a creel census at the St. Mary's Rapids.

A freshwater invertebrate collection is required.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course the student will:

1. Operate and where necessary, calibrate the following instruments and equipment used in aquatic surveys: oxygen meter, conductivity meter/ bridge, pH meter, HACH kit, secchi disk, Juday plankton net, kemmerer bottle, Wisconsin plankton net, sample tube, depth finder (Lowrance X-1550), current meter, surber sampler, electrofisher.

2. Demonstrate in the field, the effective use of passive and active fish capture techniques such as gill nets, trap nets, minnow traps, seines and electrofisher.

3. Discuss the limiting factors and requirements for commonly used fish capture techniques.

4. Discuss the effect on fish physiology, the mechanics and safety concerns when operating an electrofisher.

5. Construct a physical features map, contour map and stream gradient profile for the areas of study.

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II. STUDENT PERFORMANCE OBJECTIVES: (cont'd)

6. Calculate volume from the lake contour map.

7. Complete all summary forms, field collection records and scale sample envelops for the areas of study.

8. Calculate stream velocity and discharge using current meter measurements from field data.

9. Process fish by determining and recording total length, fork length, weight, sex, stomach contents, state of health and by removing scales, fin rays, cleithrum and/or otoliths for age determination.

10. Explain the objectives of conducting a creel census/sample and describe the two design types and the calculation differences for each in determining C.U.E. and harvest.

11. Conduct creel census/sample interviews with anglers and record information on interview forms and/or hand-held computers.

12. Distinguish among aquatic invertebrate families and make a collection of 25 freshwater invertebrate identified correctly to at least Family.

13. Describe various fish tagging and marking techniques and their limitations.

14. Discuss the methods of estimating fish populations and describe the signs of over-exploitation.

15. Describe the life cycles and importance of common fish parasites of Ontario.

16. Demonstrate ageing techniques using scales, fin rays and otoliths, including the preparation of these structures and the interpretation of age.

17. Outline the significance in age determination of fish and explain the procedure of back-calculations.

III. TOPICS TO BE COVERED:

1. Lake Survey.
2. Stream Survey.
3. Creel census - objectives and design.
4. Fish tagging, marking and capture.
5. Fish Parasites.
6. Fish Population Estimates and Ageing Techniques.

AQUATIC SURVEYS (FOR328)

BIOLOGICAL COLLECTION REQUIREMENTS

GENERAL

A collection of 25 different species of aquatic freshwater invertebrates is required for presentation. Collection will be worth no less than 10% of the final grade. Deadline for submission is September 30.

COLLECTION

Students are urged to start collecting specimens this summer. Some equipment may be loaned to students by the Department for collection in the fall. Students are required to purchase specimen bottles and preservative.

PRESERVATION

An alcohol preservative is recommended. Preferably a 70-80% ethyl alcohol and water solution. Ethyl alcohol is available at most drug stores. This method is for short term preservation (3-4 months).

For a longer term preservation use Kahle's Solution for all invertebrates except snails, clams and crayfish:

59 ml Distilled Water
2 ml Glacial Acetic acid
28 ml 95% Ethanol
11 ml Formalin

100 ml Total

For snails, clams and crayfish use 10% Buffered Formalin:

10% Buffered Formalin

1. Prepare Formalin by mixing 40 parts formaldehyde (H_2CO) with 60 parts distilled water.

2. Prepare 10% Formalin by diluting 1 part formalin (from #1 above) to 9 parts distilled water.

3. Add magnesium carbonate or household borax to 10% formalin (#2 above) in an amount to maintain a slight deposit on bottom of bottle (borax or magnesium carbonate will neutralize slightly acidic formalin).

PRESENTATION

Specimens are individually preserved in vials* or screw capped jars of suitable size. Specimen jars are numbered to correspond with a separate species listing with classification and pertinent information:

1. date of capture
2. location
3. depth and temperature of water
4. habitat description (substrate type, veg.)

Specimen Listings (see attached example of a specimen listing) will be typed and presented within a report cover. The collection report will contain:

1. title page
2. species index and reference number
3. specimen listings (25)
4. references used

CLASSIFICATION

For each specimen, give a reduced hierarchical classification as follows:

Phylum
Class
Order
Family (a passing grade for collections ID'd correctly to Family)
Genus (full marks awarded to collections ID'd correctly to Genus)

Use a bifurcating identification key. DO NOT CLASSIFY ON THE BASIS OF SUPERFICIAL RESEMBLANCE TO LINE DRAWINGS IN SIMPLIFIED FIELD GUIDES.

***Vials available at College Bookstore or any drugstore.**

REFERENCE LIST FOR COLLECTION IDENTIFICATION

Edmunds, G. R. - Mayflies of North and Central America. Minneapolis, University of Mineapolis Press, 330 p.

Needham, P. R. and Heedham, J. G., 1969 - Guide of the Study of Fresh Water Biology. San Francisco, Holden-Day Inc., 108 p.

*Needham, J. S., J. R. Traver and Y. -C. HSU. 1972 - The Biology of Mayflies. Hampton, E. W. Classey. 759 p.

*Pennak, R. W., 1953 - Fresh Water Invertebrates of the United States, New York. The Ronald Press Company. 769 p.

*Merritt, R. W. and K. W. Cummins, 1978. An Introduction to the Aquatic Insects of North America. Dubuque, Kendal/Hunt. 441 p.

*Wiggins, G. B. 1977 - Larvae of the North American caddisfly genera (Trichoptera). Toronto, University of Toronto Press. 401 p.

*These references will be particularly useful.