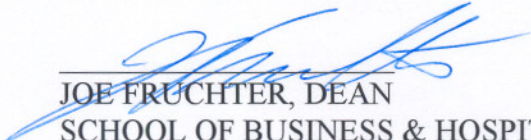


**SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**

**COURSE OUTLINE**

COURSE TITLE: Aquatic Surveys  
CODE NO.: FOR 328-4 SEMESTER: VI Summer  
PROGRAM: Water Resources Engineering Technology  
AUTHOR: H. Robbins  
DATE: May 1997  
PREVIOUS OUTLINE DATED: July 1993

APPROVED:   
JOE FRUCHTER, DEAN  
SCHOOL OF BUSINESS & HOSPITALITY,  
NATURAL RESOURCES PROGRAMS &  
COMPUTER PROGRAMS

DATE: 

TOTAL CREDITS:

PREREQUISITES: BIO125 (Water Resources)

LENGTH OF COURSE: TOTAL CREDIT HOURS: 64

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## **I. COURSE DESCRIPTION:**

This is 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 of identified specimens is required.

## **II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

### **A. Learning Outcomes:**

1. Operate and where necessary, calibrate the following instruments and equipment used in aquatic surveys: oxygen meter, conductivity meter, pH meter, HACH kit, secchi disk, Juday plankton trap, Kemmerer water bottle, Wisconsin plankton net, sample tube, depth finder (Lowrance X-1550), current meter, surber sampler, electroshocker and hydrolab.
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 electroshocker. Discuss the effect of electroshocking on fish physiology and the mechanics and safety concerns when operating an electroshocker.
3. Discuss the limiting factors and requirements for commonly used fish capture techniques and select appropriate equipment based on field situation and purpose for capture.
4. Operate boat with outboard motor in a safe and proper manner in order to collect data for the lake survey report.



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5. Construct a physical features map, contour map and stream gradient profile for the areas of study.
6. Calculate lake volume from the lake contour map.
7. Complete all summary forms, field collection records and scale sample envelopes 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/survey and describe the two design types and the calculation differences for each in determining C.U.E. and harvest.
11. Conduct creel census/survey interview 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 invertebrates 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. Demonstrate aging techniques using scales, fin rays and otoliths, including the preparation of these structures and their interpretation for determination of age.
16. Outline the significance of age determination in fish populations and explain the procedure of back-calculations in determining growth rates.

B. Learning Outcomes and Elements of the Performance:

Upon successful completion of this course, the student will demonstrate the ability to:



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1. - observe demonstration on use of each instrument listed
  - following instructions given and written instructions accompanying each instrument (where available) operate equipment in order to obtain the measurements necessary to complete the lake or stream surveys
  - record results in field notebook and transpose to appropriate spaces on relevant survey report forms or use data in later calculations
2. - observe demonstration and assist in the setting and removal of various nets
  - operate electroshocker to capture fish in stream/littoral settings in a safe and efficient manner
  - assist electroshocker operator in collecting stunned fish with an eye on ensuring safety for all concerned
3. - select appropriate fish capture equipment and locations in order to monitor and determine fish variety and population levels
4. - demonstrate safe operation of outboard motor and boat for lake survey data collection
5. - using graph data collected in the field, construct physical features and contour maps for a local lake
  - using data obtained from a topographical map, prepare a stream gradient profile for a local stream
6. - using previously constructed contour map, evaluate lake volume
7. - transfer all field data to summary forms required for lake/stream survey reports
  - convert field data where necessary to form required in the report
  - complete field collection record forms
  - complete scale sample envelopes
8. - obtain depth and velocity measurements using the float method and current meter
  - calculate stream discharge using above field data collected
9. - remove fish from collection gear
  - identify all fish collected (a sample where multiple specimens are captured will do) using fish identification books
  - where appropriate, determine and record lengths, weight, sex, stomach contents, state of health, etc.
  - obtain samples of scales, fin rays, cleithrum and/or otoliths for age determination where appropriate

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10. - select creel survey type based on characteristics of the sampling site  
- calculate C.U.E. and projected harvest levels from survey data
11. - using appropriate protocol, obtain creel survey data from anglers as part of an actual creel survey
12. - collect, preserve, identify to family and display 25 different aquatic invertebrates from the Algoma region
13. - observe demonstration of tagging and marking of fish  
- describe advantages and disadvantages of various marking techniques  
- select appropriate marking techniques for use in selected study types
14. - describe three important methods with formulae, for estimating fish populations  
- describe the signs of stress/over-exploitation in a fish population
15. - observe the removal of fish aging structures  
- describe methods used to observe aging of fish from scales, otoliths and fin rays
16. - explain importance of age determination in population studies  
- demonstrate the technique of back calculation for growth rate determination

### **III. TOPICS:**

\*Note: These topics sometimes overlap several areas of skill development and are not necessarily intended to be explored in isolated learning units or in the order below.

1. Schedule of Course Activities.
2. Review of Fish Anatomy and Identification.
3. Fish Aging Methods.
4. Stream Survey.
5. Lake Survey.
6. Fish Tagging Marking and Capture.



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7. Fish Population Estimates.
8. Creel Survey - Objectives and Design.

#### **IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

Textbooks:

Dodge, D.P. et al. 1986. Manual of Instructions, Aquatic Habitat Inventory Surveys. Fisheries Branch, Ontario Ministry of Natural Resources., 159 pp.

Sault College 1996. Aquatic Surveys (FOR246) Lab Outline. 25 pp. and Forms.

Other Required Student Resources:

- dissection kit
- field notebook
- lab coat (optional)
- lettering set (ink pen set) with pen numbers 00, 1, and 2
- vellum paper and vellum graph paper (size and quantity to be described when needed)

#### **Additional Resources Materials Available in the College Library:**

Lehmkuhl, D.M., 1979. How to Know the Aquatic Insects. Wm. C. Brown Co., Publishing, Dubuque. 168 pp.

McClane, A. J., 1978. Field Guide to Freshwater Fishes of North America. Holt, Rinehart and Winston, New York. 212 pp.

Pennak, R.W. 1978. Freshwater Invertebrates of the United States, Second edition. John Wiley and Sons, Toronto. 769 pp.

Scott, W.B. and E.J. Crossman. 1973. Freshwater Fishes of Canada. Fish. Research Board Canada, Bull. 184: 966 pp.

#### **V. EVALUATION PROCESS/GRADING SYSTEM:**

Unit tests (2)	25
Assignments/Quizzes	75

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Marks are cumulative, however due to the large field component of the course and the fact that much of the assignments are based on data collected in the field, students receiving a final grade of less than 60% will **NOT** have the opportunity to rewrite.

- N.B.** 1. Attendance during field trips is **MANDATORY**. Students missing field trips without a valid, documented reason will risk repeating the course.
2. **ALL** submissions must be made for a passing grade.

### SUMMARY OF STUDENT EVALUATION

	<u>Value</u>
Aquatic Collection	15
Lake Contour Map and Data Collection Sheet (Volume Calculation)	15
Physical Features Map	10
Remaining Lake Survey Forms	10
Gradient Profile/Stream Survey Forms and Discharge Calculations	15
Term Tests	25
Discretionary (Attendance & Participation)	10
	100

#### Late Assignments:

Ten percent (10%) will be deducted from the total value of the assignment for every day late.

#### **VI. SPECIAL NOTES:**



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### Special Needs

If you are a student with special needs (eg. Physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717 or 491 so that support services can be arranged for you.

### Plagiarism

Students should refer to the definition of “academic dishonesty” in the “Statement of Students Rights and Responsibilities.”

Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course, as may be decided by the professor.

In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

### Advanced Standing

Students who have completed an equivalent post-secondary course should bring relevant documents to the Coordinator, Natural Resources Programs.

### Retention of Course Outlines

It is the responsibility of the student to retain all course outlines for possible future use in gaining advanced standing at other post-secondary institutions.

Substitute course information is available at the Registrar’s Office.

## **VII. PRIOR LEARNING ASSESSMENT:**

Please contact the Prior Learning Assessment Office (H0240) for further information.