

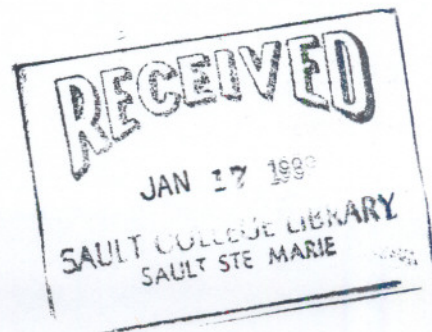
SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: ENVIRONMENTAL ANALYSIS (OUTLINE & LAB MANUAL)
 Code No.: FOR 364-6
 Program: FISH AND WILDLIFE TECHNOLOGY
 Semester: FIVE
 Date: JANUARY, 1989
 Author: VALERIE WALKER

New: X Revision:

APPROVED: *Valerie Walker* Chairperson *Dec 22/88* Date



CALENDAR DESCRIPTIONENVIRONMENTAL ANALYSIS

FOR 364-6

COURSE NAMECOURSE NUMBERPHILOSOPHY/GOALS:

This lab-based course provides the measurement and analysis of various parameters within the environment as well as a discussion of their significance. Topics include instrument operation, calibration and standardization and proper laboratory techniques. Labs will examine primary production, oxygen consumption in aquatic systems, response of organisms to a toxicant (bioassay) and wildlife age determination. In addition, organic molecules of importance as related to the nutritional requirements of wildlife, will be studied with a practical application to bomb calorimetry.

METHOD OF ASSESSMENT (GRADING METHOD):

A - 80%
 B - 70%
 C - 60%
 R - less than 60%

Lab Reports - 70%
 Term Tests (3) - 30%

100%

EVALUATION:

Due to the practical nature of this course and the emphasis on laboratory technique and data interpretation, there will be no opportunity for a "rewrite".

Students with a final grade of less than 60% will receive an "R" grade. All labs must be submitted for a passing grade.

ATTENDANCE:

Lab attendance is **compulsory**. Students missing labs without documented reason run the risk of repeating the course.

TEXTBOOK(S):

No textbook required for purchase. Lab manual is available at Campus Bookstore. Several reference books are on reserve at the Learning Resources Centre.

LECTURE/LAB FORMAT

WEEK

- 1 Introduction
- evaluation
 - course outline
 - lab safety
 - lab equipment
- 1 **Lab 1 Densities of Liquids and Solids**
- 2,3 Unit I: Primary Production
- primary production limitation by light
 - primary production limitation by nutrients
 - factors affecting productivity
- 3 **Lab 2 Primary Production in Standing Water**
- 4 Unit II: Oxygen Consumption in Aquatic Animals
- factors affecting oxygen consumption
- 4 **Lab 3 Temperature & Oxygen Consumption in Aquatic Animals**
- 5 Unit III: Toxic Pollutants
- types of toxic pollutants
 - toxicity
 - environmental factors affecting toxicity
 - transformations
 - tolerance
 - accumulation
 - (Video)
- 6 **Lab 4 Bioassay**
- 7 - (Speaker: Sea Lamprey)
- 7 **TERM TEST #1**

8 Unit IV - Aquatic Surveys Through the Ice
 - ice formation and its effect on light, production, oxygen

8 **Lab 5 Winter Lake Survey**

9 Unit V: Lake Acidification

- sources of acid rain
- emission trends
- aquatic/terrestrial effects
- (speaker)
- (video)

9 **Lab 6 Total Inflection Point Alkalinity**

10,11 Unit VI: Organic Molecules in Wildlife Nutrition

- required nutrients:
 - water
 - protein
 - carbohydrates
 - lipids
- energy metabolism
- macrominerals
- micro (trace) minerals

11 **Lab 7 (a) Bomb Calorimetry - Sample Preparation**

12 **TERM TEST #2**

12 **LAB 7 (b) Bomb Calorimetry - Bombing**

13 Unit VII: Aging of Fish Structures

- introduction
- application
- structures used

14 **Lab 8 Aging Workshop - Extraction & Preparation/Sectioning**

15 **TERM TEST #3**

N.B. SCHEDULE SUBJECT TO CHANGE

REPORT WRITING

All lab reports should be written on a word processing program and include the following components:

1. Purpose/Objective

- a brief statement outlining the intent of the exercise. Objectives may be itemized, i.e.,
 - a) to determine LC_{50} for zinc using rainbow trout
 - b) to investigate the relationship between water temperature, pH, alkalinity and the toxicity of zinc to rainbow trout

2. Method/Procedure

- a brief outline of how the exercise was conducted. In many instances "Refer to manual" will suffice.

3. Results

- a presentation of results, and only results, in an organized format, i.e., TABLE FORMAT. There should be no sentences, no paragraphs--table and figures (graphs) only. Be sure all table and figures are entitled and numbered.

4. Calculations

- one example of each different calculation used in presenting the results should appear in this section. Subsequent work using the same calculations should appear in the Appendix. Hence, with the exception of one example calculation, all calculations used to generate data in tables must be shown in the Appendix.

5. Discussion of Results and Conclusions

- results are interpreted and discussed. Carefully observe data to determine trends and relationships among all parameters measured.

Are apparent relationships consistent with established relationships present in literature? In this section, you are responsible for conducting a literature search to compare your findings with that of established authors.

Be sure to refer to your data using table and figure numbers - e.g., a direct linear relationship between white sucker weight and fork length is apparent in Figure 2. This relationship agrees well with that established for white sucker by J. A. Smith (1982), W. T. Jones (1974) and B. R. Brown (1971).

If your findings are not consistent with other studies or theories, offer some explanation for the deviation.

e.g., According to Saunders (1972), the principle component of lake trout stomach samples (n=785) in Round Lake prior to 1965 was lake herring (Coregonus artedii) at 72% by volume. Data from this study, however, indicates rainbow smelt (Osmerus mordax) as the dominant food item in 525 lake trout sampled, averaging 97% of stomach contents by volume (Figures 1 and 2). This change in forage species preference is attributed to the introduction of rainbow smelt in 1969 (Wilson, 1971).

All questions posed at the end of a lab exercise should be answered in this section.

N.B. There are several acceptable methods of citing references and referring to your data within the text of your report. Footnotes are not acceptable. Quotes are not acceptable.

N.B. Scientific names of species should appear in brackets only once after the first time the common name appears in the text.

In addition to interpreting and discussing, conclusions should be clearly stated, often itemized, at the end of this section.

6. Sources of Error

- itemize all possible sources of error.

7. Appendix

- present calculations for all values appearing in tables.

8. References Cited

- presented on a separate page at end of report
- all citations in text of report must be listed alphabetically in this section and conversly all references listed in this section must be cited in the text of the report.

i.e.:

1) **For paper presented in a journal:**

Mason, C. F. and R. J. Bryant. 1974. The structure and diversity of the animal communities in a broad land reed-swamp. J. Zool., 172: 289-309

issue no. page reference

2) **For book references:**

Hynes, H. B. N., 1970. The Ecology of Running Waters. Liverpool University Press, Liverpool.

3) **For paper/chapter presented in publication:**

Chapman, D.W. 1978. Production in fish pupulations. In Ecology of Freshwater Fish Production (S.D. Gerking, ed.). Blackwell, Oxford.

MAJOR DO'S AND DON'TS

1. Don't use first person in report text, i.e., I, we, our.
2. Do refer to tables and figures by number. Be sure all tables and figures in Results are numbered and entitled.
3. Use correct citation of references.
4. Do not use quotes.
5. Scientific names of species need only appear once in text of report. They are placed in brackets and underlined after the common name of the species appears for the first time.

REPORT MARKING - ONE REPORT SUBMITTED PER STUDENT

SECTION	MARK	MARKING BASED ON
1. Purpose	1	Conciseness; completeness
2. Method	1 (if applicable)	Conciseness; completeness
3. Results	2	Organization; labels, numbers on tables, figures; neatness; correctness
4. Calculations	1	Correctness, completeness
5. Discussion	4 or 5 if method not applicable	Conciseness; organiz- ation; reference material used and cited; complete- ness
6. Errors	1	Completeness
TOTAL		10
7. Appendix	minus 1 mark if absent or incorrect	
8. References Cited	minus 1 mark if absent or incorrect	

N.B. TEN PERCENT (10%) DEDUCTED PER DAY FOR LATE REPORTS

GLASSWARE PREPARATION

For accuracy, glassware must be properly cleaned of all impurities prior to conducting lab exercises.

1. Wash all glassware needed in warm soapy water. Use brushes if necessary.
2. Rinse glassware 3 times under tap water.
3. Rinse glassware with 10% nitric acid.
4. Rinse glassware well with distilled water 3 times.
5. Place glassware upside down on paper towel to drain