

Revised.

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

✓

Course Title: WATER POLLUTION

Code No.: BIO 129-4


Program: WATER RESOURCES TECHNOLOGY/PULP & PAPER ENGINEERING TECHNOL.

Semester: IV

Date: JUNE, 1985

Author: V. WALKER

New: _____ Revision: X

APPROVED: 
Chairperson

March 11/86.
Date

BIO 129-4 WATER POLLUTION

Water Pollution

BIO 129-4

COURSE NAME

COURSE NUMBER

PREREQUISITE: AQUATIC BIOLOGY 125-3

PHILOSOPHY/GOALS:

A course designed to provide an introduction to the biological effects of water pollution and to ways of detecting, describing and quantifying these effects in the field and the laboratory. Types and sources of pollution, sampling strategies and legislation governing water quality will be discussed.

METHOD OF ASSESSMENT (GRADING METHOD):

Oral Presentation:	10 marks	90% & over - A+
Lab Reports (5)	60 marks	80-89% - A
Term Tests (3)	30 marks	70-79% - B
	<hr/> 100 marks	60-69% - C
		Under 60% - I

EVALUATION

Students receiving a final grade of less than 60% but greater than or equal to 55%, will rewrite the unit test they performed the poorest during the rewrite period.

Students receiving less than 55% will write a final exam covering the entire course content during the rewrite period.

TEXTBOOK(S):

Mason, C. F., 1981. Biology of Freshwater Pollution, Longman Group Ltd., New York.

REPORT WRITING

All lab reports should 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 use 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 conceivable sources of error.

7. Appendix - present calculations for all values appearing in tables.
8. Reference - presented on a separate page at end of 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.

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 TWO STUDENTS

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, 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. Reference	minus 1 mark if absent or incorrect	

N.B. Ten percent (10%) deducted per day for late reports.

WATER RESOURCES TECHNOLOGY

BIO 129-4

WATER POLLUTION

UNIT 1 INTRODUCTION

- what is pollution
- complexity of pollution
- the ecosystem concept
- (video)

UNIT 2 FRESHWATER SYSTEMS

- general characteristics
- the lotic environment
- the lentic environment
- stability of ecosystems

TERM TEST #1

UNIT 3 CHEMICAL AND PHYSICAL ASPECTS OF WATER POLLUTION

- dissolved oxygen
- carbon dioxide
- pH, acidity, alkalinity, hardness
- hardness
- phosphorus
- total dissolved solids
- transparency, colour
- BOD, COD

UNIT 4 BIOLOGICAL ASPECTS OF WATER POLLUTION

- (Film Strip: Freshwater Pollution)
- eutrophication
- bottom fauna
- bacteria, algae
- zooplankton, fish
- (Video: H₂ Overview)

TERM TEST #2

UNIT 5 TYPES AND SOURCES OF POLLUTION

- students' oral presentations
- toxicity
- environmental factors affecting toxicity
- tolerance, accumulation

UNIT 6 SAMPLING FOR WATER QUALITY

- apparatus
- sampling sites
- sampling strategy
- index species (SCI, biotic, diversity, indices)

UNIT 7 LEGAL ASPECTS OF WATER POLLUTION

- acts and legislation governing water quality
- (Video: Speaking Out - The Politics of Garbage)
- (MOE Speaker)

TERM TEST #3

LAB SCHEDULE

1. Lab 1. Temperature and Oxygen Consumption in Aquatic Organisms.
2. Lab 2. Primary Production of Standing Water.
3. Lab 3. Standard Bacterial Plate Count.
4. Lab 4. Comparison of Polluted and Unpolluted Areas of a Stream.
5. Lab 5. Bioassay

PRESENTATION TOPICS

Students are required to deliver a 20-minute oral presentation during a predetermined time slot. Students will work in groups of two and presentations will include visual aids as well as oral material delivered by each student. Term Test #3 will include information from students' presentations. The following topics are available for presentation:

1. Heavy metals and mining (lead, arsenic, barium, chromium, cadmium).
2. Mercury.
3. Oil.
4. Pesticides (DDT, 2, 3, 5-T)
5. Pulp mill wastes.
6. Waste heat.
7. Nuclear waste.
8. Farm animal wastes.
9. Exotic fish species. (Alewife, carp, pink salmon, etc.)

10. Detergents.
11. Acid rain.
12. Mirex, dioxin.
13. Water-borne pathogens.
14. PCB's.
15. Food Processing Wastes.

NOTE: Include in each presentation:

1. Description of the pollutant.
2. Sources of the pollutant (natural, man-caused).
3. The effect of the pollutant on the environment.
4. The water quality guidelines (standards) for the pollutant.
5. Any pertinent incidents* involving the pollutant.
6. Clean up/Controls (if applicable).

*Canadian incidents if possible

Each student group is responsible for producing an abstract (summary) of information presented as well as a list of references used.

Copies of each presentation summary and reference list will be produced (by instructor) for all students.