SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: BIOLOGY OF WATER POLLUTION

Code No.: WTR 200-4

Program: WATER RESOURCES TECHNOLOGY

Semester: IV

Date: DECEMBER, 1983

Author: V. WALKER

New; Revision:

APPROVED; Chairperson Date

WATER RESOURCES TECHNOLOGY
WTR 200-4
WATER POLLUTION

CALENDAR DESCRIPTION

BIOLOGY OF WATER POLLUTION	WTR 200-4
COURSE NAME	COURSE NUMBER

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 in the laboratory.

METHOD OF ASSESSMENT (GRADING METHOD):

Unit test (3) will be written at the conclusion of Units 3, 6 and 8. Each unit test will be of equal value comprising 60% of the total mark. Laboratory reports (4) will make up the remaining 40% of the total grade.

90% and over - A+
80-89% - A
70-79% - B
60-69% - C
Under 60% - I

TEXTBOOK(S):

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

OBJECTIVES:

At the completion of the course students:

1) Will have a basic understanding of the complexity of pollution and the need for biological surveillance.

2) Will identify biological, physical and chemical parameters characteristic of natural equatic ecosystems.

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3) Will cite the origins of organic pollutants and describe their effect on receiving water bodies.

4) Will demonstrate the procedure for quantifying bacterial populations in a water sample.

5) Will identify various species of freshwater algae and macro-invertebrates typical of both clean and polluted waters.

6) Will demonstrate a knowledge of the process of eutrophication, its effects and control.

7) Will define toxicity and the nature of various toxic wastes on the aquatic environment.

8) Will conduct a bioassay and interpret results.

9) Will demonstrate a knowledge of water quality criteria and water standards.

10) Will execute a computer exercise modelling a typical pollution setting.

11) Will recite the various laws and regulations pertaining to water pollution.

UNIT #1 - INTRODUCTION

- what is pollution
- monitoring pollution
- biological surveillance
- the complexity of pollution

UNIT #2 - THE AQUATIC ECOSYSTEM

- the lotic environment
- the lentic environment
- stability of ecosystems *Turk

UNIT #3 - ORGANIC POLLUTION

- origins
- pathogens (SPEAKER) (LAB #1) p. 166 Mason
- effects on receiving water: algae, benthos, productivity (LAB #2) See Clark, Water Supply & Pollution Control

UNIT TEST

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UNIT #4 - EUTROPHICATION

- sources
- effects
- control

UNIT #5 - TOXIC POLLUTION

- types of toxic pollutants - gross pollutants
  - heavy metals & mining
  - mercury pollution
  - oil pollution
  - herbicides & pesticides
  - pulp mill wastes
  * Turk/Willeer & Larken
- toxicity
- environmental factors affecting toxicity
- tolerance
- accumulation
- bioassay (LAB #3) (SPEAKER)
- water quality criteria, STANDARDS

UNIT #6 - WASTES FROM POWER PLANTS (Heat & Nuclear & Mines)

- thermal pollution
- nuclear waste
- acid mine drainage

UNIT TEST

UNIT #7 - BIOLOGICAL ASSESSMENT OF WATER QUALITY IN THE FIELD

- sampling strategy
- choice of organisms for surveillance (LAB #4)
- sampling macro-invertebrates

UNIT #8 LAND USE, WATER USE & POLLUTION

- environmental laws *Larken

UNIT TEST

REFERENCES:

Alabaster, J.S., and R. Lloyd, 1982, Water Quality Criteria for Freshwater Fish, Second Edition, Food and Agriculture Organization of the United Nations, Butterworths Scientific, Toronto

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Andrews, William A., 1972, A Guide to the Study of Environmental Pollution, Prentice-Hall, Scarborough, Ontario

Andrews, William A., 1972, Freshwater Ecology, Prentice-Hall, Scarborough, Ontario

Black, John A., 1977, Water Pollution Technology, Reston Publishing Co., Inc., Reston, Virginia

Clark, John W., Warren Viessman, Jr., and Mark J. Hammer, 1977, Water Supply and Pollution Control, Harper and Row Publishers Inc., New York

Environmental Protection Agency, March, 1973, Water Quality Criteria, 1972, Washington D.C.

Goldman, Charles R., James McEvoy III and Peter J. Richerson, 1973, Environmental Quality & Water Development, W.H. Freeman and Company, San Francisco

Hynes, H.B.N., 1966, The Biology of Polluted Waters, Liverpool University Press, Liverpool

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

Khan, Mohammed Abdul (ed.), 1977, Pesticides in the Aquatic Environment, Plenum Press, New York

Larkin, P.A., 1974, Freshwater Pollution, Canadian Style, McGi11-Queen's University Press, Montreal

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

Warren, Charles E., 1971, Biology and Water Pollution Control, W.B. Saunders Company, Toronto

Wilber, Charles G., 1969, The Biological Aspects of Water Pollution, Charles C. Thomas, Springfield, Illinois

Turk, Amos, Jonathan Turk and Janet T. Wittes, 1972, Ecology, Pollution, Environment, Saunders College Publishing/Holt, Rinehart and Winston, Philadelphia