

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

COURSE OUTLINE

Course Title: ENVIRONMENTAL MEASUREMENTS (OUTLINE & LAB MANUAL)
Code No.: FOR 307-4
Program: FISH AND WILDLIFE TECHNOLOGY
Semester: SIXTH
Date: JUNE, 1987
Author: VALERIE WALKER

New: _____ Revision: X

APPROVED: *[Signature]*
Chairperson

Aug 22/87
Date



CALENDAR DESCRIPTION

ENVIRONMENTAL MEASUREMENTS

FOR 307-4

COURSE NAMECOURSE NUMBERPHILOSOPHY/GOALS:

This is a course providing the measurement and analysis of various parameters within the environment as well as a discussion of their significance.

Included are examinations of primary production, oxygen consumption in aquatic systems, responses of organisms to a toxicant (bioassay), fish health as a reflection of the environment, aging structures and age determination of wildlife.

METHOD OF ASSESSMENT (GRADING METHOD):

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

Lab Reports - 50%
 Term Tests (3) - 50%

100%

EVALUATION:

Students receiving a final grade of less than 60% will write a final exam covering the entire content during the rewrite period.

Students failing two or more term tests will be required to write a final exam, regardless of their accumulated mark.

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. **A** 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

Unit I: Primary Production

- primary production limitation by light
- primary production limitation by nutrients
- factors affecting productivity

2 **Lab 1: Primary Production in Standing Water**

3 Unit II: Oxygen Consumption in Aquatic Animals

- factors affecting oxygen consumption

3 **Lab 2: Temperature & Oxygen Consumption in Aquatic
Animals**

4 Unit III: Toxic Pollutants

- types of toxic pollutants
- toxicity
- environmental factors affecting toxicity
- transformations
- tolerance
- accumulation
- (Video)

5 **Lab 3 - Bioassay**

- (Speaker: Sea Lamprey)

6 **TERM TEST #1**

- 7,8 Unit IV: Fish Health and The Environment
- neoplastic diseases of fish
 - diseases caused by toxic substances and organic wastes
 - (Video: Early Warning)
 - (Speaker)
- 9 Unit V - Aquatic Surveys Through the Ice
- ice formation and its effect on light, production, oxygen
- 9 **Lab 4 - Winter Lake Survey**
- 10 Unit VI: Aging of Fish Structures
- introduction
 - application
 - structures used
- 11 **TERM TEST #2**
- 11 **Lab 5: Fish Aging I - Extraction & Preparation of Structures**
- 12 **Lab 6: Fish Aging II - Sectioning and Age Determination Workshop**
- 13,14 Unit VII: To Be Announced
- 15 **TERM TEST #3**

N.B. SCHEDULE SUBJECT TO CHANGE

Freshwater Fish (2nd Edition). Toronto, Ontario, Canada: McGraw-Hill, 1975.
MA.

*American Public Health Association, American Water Works Association, and Water Pollution Control Federation, 1975, Standard Methods for the Examination of Water and Wastewater. 14th ed. Am. Publ. Health Assoc., Washington, D.C.

*American Society for Testing and Materials. 1977. Bacterial Indicators - Health Hazards Associated with Water. ASTM, Phil.

*American Society for Testing and Material. 1977. Aquatic Toxicology and Hazard Evaluation. ASTM, Philadelphia.

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

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

Burns, Noel M. 1985. Erie: The Lake that Survived. Rowman & Allanheld Pub., Totowa, N.J.

*Cairns, John Jr. 1982. Biological Monitoring in Water Pollution. Pergamon.

Cairns, V.W., Hodson, Peter V. and Nriagu, J.O. 1984. Contaminant Effects on Fisheries. John Wiley & Sons, New York.

Chant, D. A. 1970. Pollution Probe. New Press, Toronto.

Edmondson, W. T. (1969). Eutrophication in North America. In - Eutrophication - Causes, Consequences, Correctives. pp. 124-49. National Academy of Sciences, Washington.

Environmental Protection Agency. 1970. Water Quality Criteria. E.P.A. R3-73-033. Washington, D.C.

*Environmental Studies Board. 1983. Acid Decomposition: Atmospheric Processes in Eastern North America. National Academy Press.

*Goldman, Charles R. and A. J. Horne. 1983. Limnology. McGraw-Hill, Toronto.

*Gordon, Malcolm S. 1982. Animal Physiology: Principles and Adaptations (4th edition). MacMillan Publishing Co., Inc. New York.

Hammer, Mark J., 1986. Water and Wastewater Technology. John Wiley and Son Inc., New York.

BIBLIOGRAPHY...2

- *Hoar, W. S. 1983. General and Comparative Physiology (3rd Edition). Prentice-Hall, Inc., New Jersey.
- Hoar, W. S., and D.J. Randall, (eds.). 1979. Fish Physiology. Vol.7: Locomotion. Academic Press, Inc., London.
- *Hoar, W.S., D.J. Randall and J.R. Brett (eds). 1979. Fish Physiology. Vol.8: Bioenergetics and Growth. Academic Press, Inc., London.
- *Hynes, H. B. N. 1970. The Ecology of Running Waters. University Toronto Press, Toronto.
- _____. 1974. The Biology of Polluted Waters. University Toronto Press, Toronto.
- Kimball, John W. 1978. Biology. 4th Ed. Addison-Wesley, Don Mills, Toronto.
- *Krenkel, P.A. and Parker, F.L. 1973. Nation Symposium on Thermal Pollution Proceedings: Biological Aspects of Thermal Pollution.
- *Larkin, P.A. 1974. Freshwater Pollution Canadian Style. McGill-Queen's University Press, Montreal.
- *Laws, Edward A. 1981. Aquatic Pollution - An Introductory Text. John Wiley and Sons, Toronto.
- Mason, C. F. 1981. Biology of Freshwater Pollution. Longman.
- McKane, L. and Kandel J., 1985. Micro-Biology Essentials and Applications. McGraw-Hill Book Co., Toronto.
- *McNeely, R. N., V. P. Neimanis and L. Dwyer. 1979. Water Quality Sourcebook Guide to Water Quality Parameters. Environment Canada, Inland Waters Directorate, Water Quality Branch, Ottawa.
- Murty, A.S. 1986. Toxicity of Pesticides to Fish. CRC Press. Boca Raton, FLA.
- *National Research Council of Canada. 1985. TFM and Bayer 73: Lampricides in the Aquatic Environment. Pub. No. NRCC 22488, Ottawa.
- Palmer, C. Mervin. 1980. Algae and Water Pollution. Castle House Publications, Ltd., England.
- Pavoni, J.L., 1977. Handbook of Water Quality Management Planning. Van Nostrand Reinhold Co., Litton Educational Publishing Inc., New York.

BIBLIOGRAPHY...3

*Reid, George K. 1961. Ecology of Inland Waters and Estuaries. Van Nostrand Reinhold Co., Toronto.

*Ruttner, F. 1963. Fundamentals of Limnology. University of Toronto Press, Toronto.

Salle, A.J., 1967, Fundamental Principles of Bacteriology. 6th edition, McGraw-Hill Book Co., Toronto.

*Smith, R. L. 1974. Ecology and Field Biology. Harper and Row Publishers, New York.

*Sprague, J. B. 1973. The ABC's of pollution bioassay using fish. Biological Methods for the Assessment of Water Quality, ASTM STP 528, American Society for Testing and Materials, 1973, pp. 6-30. (Reprint available)

Tinsley, Ian J. 1979. Chemical Concepts in Pollution Behaviour. Wiley Interscience, New York.

Tourbier, J. and R. W. Pierson, Jr. (eds.). 1976. Biological Control of Water Pollution. University of Pennsylvania Press, Inc., PA.

Vallentyne, J. R. 1974. The Algae Bowl. Lakes and Man. Canada Department of the Environment, Fish and Marine Service, Misc. Spec. Pub. No. 22: 186 pp.

Viessman, W.Jr. and M.J. Hammer. 1985 Water Supply and Pollution Control. Harper and Row, Publishers, New York.

Wagner R. H., 1971. Environment and Man. Norton, New York.

Warren, C. E. 1971. Biology and Water Pollution Control. Saunders, Philadelphia.

Wetzel, Robert G. 1983. Limnology (2nd Edition). Saunders. College Publishing, Toronto.

Wetzel, R. G., and G. E. Likens, 1979. Limnological Analyses. Saunders, Philadelphia.

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

*Worf, D. L. 1980. Biological Monitoring for Environmental Effects. Lexington Books, San Diego, CA

*ON RESERVE AT THE COLLEGE LIBRARY