

revised
August,
1985

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

COURSE OUTLINE

Course Title: WATERSHED MANAGEMENT

Code No.: FOR 318-4

Program: FISH AND WILDLIFE TECHNOLOGY

Semester: V

Date: AUGUST, 1983

Author: V. WALKER, H. COOPER

New: _____ Revision: X

APPROVED:


Chairperson

_____ Date

WATERSHED MANAGEMENT

FOR 318-4

Watershed Management

FOR 318-4

Course Name

Course Number

PHILOSOPHY/GOALS:

A practical course designed for field personnel to provide information on water management and minimizing erosion and sediment on land undergoing development or utilization.

METHOD OF ASSESSMENT (GRADING METHOD)

Unit Tests (4)	60%
Technical Reports (4)	40%

TOTAL	100%

TEXTBOOK(S): (Suggested)

Stream Enhancement Guide, 1980, Fisheries and Oceans and Ministry of the Environment, Province of British Columbia

Great lakes Shore Processes and Shore Protection, 1981, Ontario Ministry of Natural Resources

UNIT #1 - Physical Properties of Water Affecting Its Management

8 hrs.

- course introduction, assignments, evaluation
- density changes with salt content and temperature
- significance and properties of ice, melting point
- viscosity, surface tension, capillary action
- specific heat, energy gains and losses
- seasonal temperature profile
- dimictic and meromictic lakes
- wind, waves and seiches
- river meanders and particle movement

UNIT #2 - Control of Runoff in Watersheds

6 hrs.

- water table maintenance through vegetation planting, proper land management practices
- the role of marshlands, beaver dams
- the role of small impoundments, reservoirs and rain ponds
- the construction of small impoundments and ponds
- the prediction and measurements of runoff

UNIT TEST #1

15 hrs.

- invertebrates and their requirements for life
- fish and their needs
- simple water chemistry and its importance
- biological indicator species
- field trip to local stream - habitat comparison
- stream improvement measures for fish-spawning areas pools, cover, stream stabilization, riffles
- pond management for recreation, fish, wildlife and waterfowl

UNIT TEST #2

UNIT #4 Erosion Control Along Streams and Rivers

8 hrs.

- channelization and its effects, effective methods of erosion control pleasing to the eye
- materials used in erosion control structures in the urban and rural environments
- structures used to improve the aquatic habitat in spillways
- the role of vegetation plantings - what to use and where
- control of riverbank use - cattle and humans
- field trip to area channel improvement projects

WATERSHED MANAGEMENT
FOR 318-4

UNIT #5 - Minimizing Disturbances in Natural Ecosystems
10 hrs.

- effects of management practices on the aquatic environment
- proper logging practices to minimize environmental damage
- importance of soils, slopes and vegetation types in resource development
- the construction of resource roads, location, stream crossing, sedimentary basins, culvert installation

UNIT TEST #3

UNIT #6 - Erosion Control Along Lakeshores
10 hrs.

- the behaviour waves
- beaches, sand bars and their formation
- shifting shores, sand dunes and lagoons
- stabilization devices for beaches, bluff protection
- field trip to Michigan sand dunes, bluffs and lakeshores
- the role of vegetation

UNIT #7 - Eutrophication and Environmental Pollutants
10 hrs.

- natural life of lakes, man's speeding up of this process
- the measurement and signs of eutrophication
- insecticides and the environment
- herbicides and the environment
- industrial pollutants including heavy metals, PCB's and acids

WATERSHED MANAGEMENT
FOR 318-4

STUDENT EVALUATION

UNIT TESTS

A total of 4 unit tests based on lecture material will be written at the completion of units 2, 3, 5 and 7. Each unit test will be worth a total of 15 marks.

Marks allotted for unit tests will be cumulative. A pass is 60%.

If a final grade of less than 60% is received on the lecture material, a test based on the entire lecture material of the course will be written during the rewrite period.

TECHNICAL REPORTS

A total of 4 technical reports will be handed in valued at 10 marks each. These reports will be based on the results of 4 separate field exercises.

Technical reports are due 2 weeks after the respective field trip. A total of 10% will be deducted for every day late. Reports submitted after 1 week of due date will receive zero.

Field trips are compulsory. Students missing field trips without documented reason will receive an automatic zero on the corresponding technical reports.

EVALUATION SUMMARY

4 UNIT TESTS (lecture material)	15 X 4 = 60%
4 TECHNICAL REPORTS (based on field trips)	10 X 4 = 40%

GRADING

60%.....	I
60 - 69%.....	C
70 - 79%.....	B
80%.....	A

WATERSHED MANAGEMENT
FOR 318-4

TECHNICAL REPORT FORMAT

Technical reports will be brief and concise and complete with diagrams/figures and tables wherever possible. Figures will be neat, labelled by hand - lettering and done entirely in black ink.

Length of report will be a maximum of 4 pages (not including title page and reference list) and will be typed or neatly printed.

Technical reports will include:

1. title page
2. abstract/summary
3. introduction
4. discussion
5. conclusion
6. reference list using the author - year system
(see reference list in this handout)

.B. FOOT NOTES ARE NOT ACCEPTABLE IN SCIENTIFIC TECHNICAL REPORTS

WATERSHED MANAGEMENT
FOR 318-4

TEXT (Suggested)

Kerr Wood Leidal Associates Ltd. and D.B. Lister and Associates Ltd. March 1980. Stream Enhancement Guide. Fisheries and Oceans and Ministry of Environment, Province of British Columbia.

Ontario Ministry of Natural Resources. October 1981. Great Lakes Shore Processes and Shore Protection.

U.S. Department of Agriculture, Forestry Service. 1966 Wildlife Habitat Improvement Handbook, Washington, U.S. Forestry Service, FSH 2609.11: 146 pp.

OTHER REFERENCES

Anderson, H.W., M.D. Hoover and K.G. Reinhart: 1976. Forests and water: effects of forest management of floods, sedimentation, and water supply. U.S.D.A. For. Serv., Pac. S.W. For. Range Exper. Sta., Rep. PSW-18: 15 p.

Bare, B.B., J.A. Ryan and G.F. Schreuder: 1974. Environmental effects of forest land uses: a multi-resource stimulation based approach. J. Environ. Sys. 4:309-340.

Case, A.B., and D.A. Rowe: 1978. Environmental guidelines for resource road construction. Fish. Environ. Can. Can. For. Serv., Info. Rep. N-X 162: 41 p.

CIBA-GEIGY Corp. 1977. Managing Ponds for Recreation and Esthetics. CIBA-GEIGY Corp., Agric. Div., Greensboro, N.C. np.

CIBA-GEIGY Corp. 1977. Make your pond come alive. CIBA-GEIGY Corp., Agric. Div., Greensboro, N.C. np.

Corrugated Steel Pipe Institute: 1972, CSP technical manual, "Solving drainage problems with steel" Mississauga, Corrugated Steel Pipe Institute. 72 p.

Dane, B.S.: 1978. A review and resolution of fish passage problems at culvert sites in British Columbia. Environ. Can., Fish Mar. Serv., Techn. Rep. 810: 126p.

Dane, B.S.: 1978. Culvert guidelines: recommendation for the design and installation of culverts in British Columbia to avoid conflict with anadromous fish. Fish Environ., Fish Mar. Serv., Techn. Rep. 811: 57 p.

WATERSHED MANAGEMENT
FOR 318-4

District Engineer. No Date. How to engineer a solution to long-term erosion problems. U.S. Army Engineer District. Roch. Is., IL. n.p.

Ehrlich, P.R. and A.H. Ehrlich: 1972. Population, resources, environment. San Francisco. W.H. Freeman. 509 p.

Fisheries and Environment Canada and Ontario Ministry of Natural Resources: No Date. Shore property hazards. Fish. Environ. Can. and Ont. Min. Nat. Resour. 14 p.

Fisheries and Environment Canada and Ontario Ministry of Natural Resources: 1978. A guide for the use of Canada Ontario Great Lakes flood and erosion prone area mapping. Fish Environ. Can. and Ont. Min. Nat Resour. 19 p

Forest Management Branch, Ontario Ministry of Natural Resources. 1975

Goodland, RI 1973. Power lines and the environment. Millbrook, N.Y., Cary Arboretum N.Y. Bot. Gardens: 170 p. (include chapters on wildlife planting, multiple use of right-of-ways, etc.)

Great Lakes Basin Commission: 1977. Great Lakes vegetation workshop proceedings. Ann Arbor, Gt. Lakes Basin Comm. 113 p.

Great Lakes Basin Commission (about 1978). The role of vegetation in shoreline management; a guide for Great Lakes shoreline property owners. Fish. Environ. Can. and Great Lakes Basin Comm., Ann Arbor. 32 p.

Hall, J.D., M.L. Murphy and R.S. Aho: 1978. An improved design for assessing impacts of watershed practices on small streams. Verk. Internat. Verein. Limnol. 20: 1359-1365

Hall, J.D. and R.L. Lantz: 1969. Effects of logging on the habitat of cho salmon and cutthroat trout in coastal streams pp. 355-375 in symposium on salmon and trout in streams edited by T.G. Northcate. Vancouver, Univ. of British Columbia.

Hausman, R.F. and E.W. Prulet: 1978. Permanent logging roads for better woodlot management. U.S.D.A., Forest Service, N.E. Area. Broomall, PA. 43 p.

Kennedy, C.E.: 1977. Wildlife conflicts in riparian management: Water. U.S. For. Serv., Gen. Techn. Rep. R43:52-58

WATERSHED MANAGEMENT
FOR 318-4

- Koger, J.L. 78. Factors affecting the construction and cost of logging roads. TAA, Div For. Fish. Wildl. Development. Tech. Note B27: 95 + 5 append.
- Latham, K.W. 1979. Shoreline erosion. Paper presented at the Coastal Engineering Design and Construction Conference, Kingston, Ontario, April, 1979. Chupler and Latham Ltd., Willowdale, Ontario p. 49-62
- Mattice, C.R. 1977. Forest road erosion in northern Ontario: a preliminary analysis. Can. For. Serv., Dept. Fish. Oceans, Rep. 0-X-254: 27 p.
- McEwen, F.L. & S.R. Stephenson. 1979. The use and significance of pesticides in the environment. New York, John Wiley. 538 p. Migel, J.M. 1974. The Stream Conservation handbook. New York Crown. Publ. 242 p.
- Moring, J.R. and R.L. Lantz. 1975. The Alsea watershed study: Effects of logging on the aquatic resources of three headwater streams of the Alsea River, Oregon. Oregon Dep. Fish Wildl., Fish. Res. Rep. 9:3 parts.
- Rothwell, R.L. 1978. Watershed Management guidelines for logging and road construction in Alberta. Environ. Can., For. Serv. Info. Rep. NORX 2088.
- Watterlund, D.R. 1972. Wildlife watershed management. New York, John Wiley, 370 p.
- Scientific American Offprints
- Soil Conservation Society of America. 1973. Wildlife and water management, striking a balance. Ankeny, Ohio, Soil Conservation Society of America. 48 p. (includes several papers on channelization and habitat improvement)
- Soil Conservation Society of America. 1977. Soil erosion: prediction and control; Proc. Natl. Conf. Soil Erosion, May 24-26, 1976, Perdue Univ., West Lafayette, IN. Ankeny, Soil Conserv. Soc. Amer.: 393 p.
- Soil Conservation Society of America 1979. Sources of native seeds and plants. Ankeny, Soil Conserv. Soc. Amer. 20 p.
- Troeh, F.R., J.A. Hobbs and R.L. Donahue: 1980. Soil and water conservation for productivity and environmental protection. Englewood Cliffs, Prentice-Hall Inc. 718 p.

WATERSHED MANAGEMENT
FOR 318-4

- U.S. Army Corps of Engineers, no date. Help Yourself. A discussion of the critical erosion problems of the Great Lakes and alternative methods of shore protection. U.S. Army Corps. Engineers, N. Cent. Div., Chicago, map.
- U.S. Army Corps of Engineers, 1976. Great Lakes Shoreland Damage Study. U.S. Army Corps Engineers, N. Cent. Div., Chicago, map
- U.S. Army Coastal Engineering Center. 1977. Shore protection manual. Washington, U.S. Good Printing Office. 3 vol.
- U.S.D.A., Soil Conservation Service. 1970. Controlling erosion on construction sites. U.S.D.A., Soil Conserv. Ser., Agr. Inf. Bull 347: 32 p.
- U.S.D.A. 1973. Farming terraced land. U.S.D.A., Leaflet 355:16 p.
- U.S.D.A. Soil Conservation Service. 1973. How to control a gully. U.S.D.A., Soil Conser. Serv., Farm. Bull. 2:171:15 p.
- U.S.D.A. 1973. Building a pond. U.S.D.A., Soil Conserv. Serv., Farm. Bull. 256:14 p.
- U.S.D.A. 1978. Making land produce useful wildlife. U.S.D.A. Soil Conserv. Serv., Fram. Bull. 2035: 29 p.
- U.S.D.A. Soil Conservation Service. 1977. Sources of planting stock and seed of conservation plants used in the northeast 1978-1979. U.S.D.A. Soil Conserv. Serv., Broomall PA. 12 p.
- U.S.D.A. Soil Conservation Serv. 1975. Urban hydrology for small watersheds. U.S.D.A. Soil Conserv. Serv., Tech. Release tt: n.p. (includes water runoff prediction equations, peak discharges, reducing peak discharges)
- U.S. Environmental Protection Agency. 1976. Quality criteria for water. Washington, U.S. Environ. Prot. Agency 256 p.
- Vegetation for the rehabilitation of pits and quarries. Toronto, Ont., Min. Nat. Resour. 38 p.
- Sawyer, C.N. 1966. Basic concepts of eutrophication pp. 462-472 in Readings in conservation ecology edited by G.W. Cox. New York, Appleton-Century Crafts.