

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: WATERSHED MANAGEMENT

CODE NO.: FOR222-4

SEMESTER: III

**PROGRAM: FORESTRY/FISH & WILDLIFE/RENEWABLE RESOURCE/
PARKS & OUTDOOR RECREATION/ABORIGINAL RESOURCE
TECHNICIAN**

AUTHOR: HARVEY ROBBINS

DATE: JULY, 1997

PREVIOUS OUTLINE DATED: JUNE, 1995

APPROVED:

Jan Rose

DEAN

July 25/97

DATE

TOTAL CREDITS:

PREREQUISITE(S):

LENGTH OF COURSE: _____

TOTAL CREDIT HOURS: 64

I. PHILOSOPHY/GOALS: This course has been developed to provide field managers with a knowledge of the processes that take place within forested watersheds and to present measures that may be used to minimize any negative effects that forest development might have on aquatic environments.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

A) LEARNING OUTCOMES:

1. Define important terms and describe concepts relating to watershed descriptions and forest hydrology.
2. Calculate drainage density from a topographical map.
3. Describe the important physical properties of both standing and running water affecting management of waters and the surrounding forested landscape.
4. Explain the factors that affect lake productivity and describe the four lake productivity classes.
5. Describe how lake ecosystems function and explain terms such as lake turnover, thermal and oxygen stratification and seiches.
6. Describe the processes that continually shape stream channels through erosion and deposition of sediments.
7. Measure and calculate stream velocity and discharge using several methods and submit a technical report based on the field determinations.
8. Describe the run-off process and explain methods by which run-off in any area can be decreased.
9. Name and describe the different types of natural features, which help to control run-off, that exist throughout the forested lands of Ontario.
10. Describe the potential effects of forest management activities on aquatic ecosystems and present methods of carrying out forestry operations while minimizing the potential for aquatic ecosystem damage.
11. Explain good practices which should be carried out when planning and building resource access roads and water crossings.
12. Describe the shore processes at work, building and eroding the shorelines of lakes.
13. Describe the correct construction methods for the building of shoreline protection devices.
14. Recommend shoreline protection measures which will protect shoreline areas from erosion.
15. Outline the erosion process along streambanks.
16. Suggest technically correct methods of minimizing streambank erosion in a variety of situations.
17. Describe the materials and construction methods used in streambank erosion structures.
18. Describe the mandate of Ontario's Conservation Authorities.

B) LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Unit 1 - Forest Hydrology

Potential Elements of the Performance:

- discuss and answer questions which demonstrate understanding of the concepts, terms and processes in watersheds and in hydrological processes
- calculate drainage density from a topographical map constitutes - 15%

Unit 2 - Properties of Water In Lakes

Potential Elements of the Performance:

- discuss and answer questions demonstrating an understanding of the important physical properties of water and how each influences the conditions in lakes and streams.
- discuss and answer questions that describe the four lake productivity classes and the process of aging of lakes.
- discuss and describe how lake systems function in terms of temperature, dissolved oxygen and nutrient levels on a seasonal basis constitutes - 10%

Unit 3 - Properties of Flowing Water

Potential Elements of the Performance:

- discuss and explain the processes which shape stream/river channels into the three important types.
- perform a stream discharge determination as part of a small group using the float and current meter methods.
- calculate discharge using field data using computer software.
- describe using sketches the physical features of a stream section.
- prepare an individual technical report, based on predetermined format, covering the above three field activities constitutes - 15%.

Unit 4 - Controlling Run-off

Potential Elements of the Performance:

- discuss and describe the factors, both natural and artificial, which affect the rate of run off in ecosystems constitutes - 10%

**B) LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE
(Continued)**

Unit 5 - Effects of Timber Management on Watersheds

Potential Elements of the Performance:

- discuss and describe the impacts of forest management practices on watersheds especially when proper procedures are not followed.
- present methods for forestry operations which minimize the potential for damage to aquatic ecosystems
- describe the potential impact of recreational activities on watersheds constitutes - 12%

Unit 6 - Constructing Forest Access Roads and Watercrossings

Potential Elements of the Performance:

- Explain good practices to be followed when planning and building resource access roads and water crossings
- prescribe and design proper water crossings given a particular situation of failure of the previous construction constitutes - 12%.

Unit 7 - Shoreline Management

Potential Elements of the Performance:

- explain by answering pertinent questions, the shore processes at work which erode, build and shape lakeshores
- recommend and describe the design of protection devices for shorelines
- observe properly and improperly constructed shoreline protection devices in the field and report on those observations constitutes - 15%.

**B) LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE
(Continued)**

Unit 8 - Field and Streambank Erosion

Potential Elements of the Performance:

- describe by answering questions, the erosion processes along streambanks
- describe the materials best used in various situations to control streambank erosion
- describe the technically correct methods of constructing streambank erosion control structures
- describe the mandate of Ontario's Conservation Authorities.
constitutes - 11%

III. REQUIRED RESOURCES/TEXTS/MATERIALS:

- **Course Manual For Watershed Management 1997** **Sault College**

**IV. EVALUATION PROCESS/GRADING SYSTEM
(Includes assignments, attendance requirements, etc.)**

- **Unit Tests (3)** **75%**
- **Assignments** **25%**

Unit 2 Summary Assignment
Streamflow Report
Roadbuilding, Harvesting Assignment
Wetland Assignment

85% - 100% = A+
75% - 84% = A
67% - 75% = B
60% - 67% = C
Less than 60% = R

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V. SPECIAL NOTES:

- **Special Needs**

If you are a student with special needs (eg. physical limitations, visual impairments, hearing impairments, learning disabilities), you are encouraged to discuss required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Ext. 493, 717, 491 so that support services can be arranged for you.

- **Retention of Course Outlines**

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.

- Disclaimer for Meeting the Needs of the Learners

- Substitute Course Information is available at the Registrar's Office.

- Any Other Special Notes appropriate to your course.

VI. PRIOR LEARNING ASSESSMENT

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the following: