SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: HYDROLOGY

CODE NO: WTR 210-5 **SEMESTER:** IV/VI

PROGRAM: ENVIRONMENTAL/WATER RESOURCES ENGINEERING TECHNOLOGY

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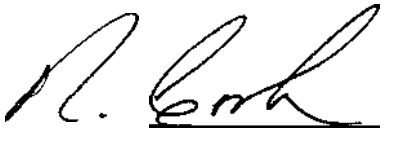
APPROVED:  /^i ric. fi /^5

DEAN DATE

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TOTAL CREDIT HOURS: 75

I. PHILOSOPHY/GOALS:

Recognize and identify the processes in the hydrologic cycle which are important for a variety of watersheds and watershed conditions. Measurement and instruments required for common hydrological data both from quantity as well as quality point of view. Basic calculation/computation techniques, including simple deterministic modeling and stochastic analysis for the solution of common hydrological problems.

II. **STUDENT PERFORMANCE OBJECTIVES:**

On the completion of the course, the student should be able to:

- Do measurement and estimation of hydrologic components including precipitation, evaporation, transpiration and infiltration.
- Do the volume balance for simplified hydrologic systems.
- Measure the quantities like stream flow velocity, elevation, precipitation and water levels and operation related hydrological equipment. Maintain a field book, interpret and analyze the data.
- Make indirect measurements and computations of stream flow.
- Apply the principles of statistics to the historical data to make forecasts about events including floods and droughts.
- Determine the impact of various flood control methods.
- Apply principles of hydrology to the prediction of precipitation and the calculation of peak runoff both for urban and rural watersheds using rational method and Soil Cover Complex method.
- Develop unit hydrographs for small watersheds using the observed stream flow data or based on other watershed characteristics.

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II. STUDENT PERFORHANCE OBJECTIVES - CONT'D

- Develop synthetic flow hydrographs based on storm and watershed properties.
- Apply the principles of hydraulics and hydrology in routing the flood wave and understanding of flood control measures.
- Determine reservoir capacity based on the hydrologic data and role of reservoirs as flood control structures.

III. TOPICS TO BE COVERED:

NO. OF WEEKS

^1. Introduction: (2)

- hydrologic cycle
- water quantity
- water quality
- continuity equation
- hydrologic budget equation

2. Precipitation (2)

- measurement of rain and snow
- analytical methods for computing averages
- areal variation
- time variability of precipitation at a point
- maximum mean rain depth area curve
- rainfall intensity duration frequency curve

3. Hydrologic Abstractions (1)

- evaporation
- transpiration, evapotranspiration
- interception, depression storage
- infiltration
- estimation and measurement

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4. Stochastic Hydrology (2)

- probability approach to the analysis of hydrologic problems
- probability distribution of hydrologic data
- flood frequency analysis
- risk analysis

5. Stream Flow (1)

- stream ganging stations
- measuring stream flow by current metering
- determining stream flow by indirect methods
- stream flow records
- flood flows

6. Rainfall-Runoff Relationships (2)

- factors affecting runoff
- components of a flow hydrograph
- hydrograph analysis
- infiltration index
- effective rainfall

7. Peak Runoff Rates (1)

- importance
- empirical formulas
- rational formula
- soil cover complex method

8. Unit Hydrograph (2)

- concept
- derivation of UH
- application of UH
- synthetic hydrograph

9. Flood Routing (1)

- importance
- continuity equation
- flood routing procedures

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10. Hydrology of Impounded Water (1)

- hydrologic routing
- construction of reservoirs
- reservoir yield/capacity
- thermal stratification

11. Water Resources Management (1)

- water quality management
- water quantity management

A laboratory exercise is developed for each topic. This allows the student to get practice in solving practical problems in the field of hydrology.

IV. EVALUATION METHODS: (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS ETC.)

The final mark will be assigned which is higher of either:

a) final examination

b) weighted mark calculated as follows:

Laboratory Exercises & Assignment Problems	25%
Midteinn Tests (2)	40%
Final Examination	35%

GRADING:

A+ = 85-100%
A = 80-84%
B = 70-79%
C = 60-69%

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V. REQUIRED STUDENT RESOURCES:

Viessman, Warren Jr., J.W. Knapp and G.L. Lewis (1977). Introduction to Hydrology, 2nd Edition, Harper and Row Publishers, New York.

VI. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY BOOK SECTION:

Ponce, Victor M. (1989), Engineering Hydrology, Prentice Hall.

Linsley, R.K. Jr., M.A. Kohler and J.L.H. Paulhus (1982). Hydrology for Engineers. 3rd Edition, McGraw-Hill Book Company, Toronto.

Gray, D.M. (Editor-in-Chief) (1970). Handbook on the Principles of Hydrolog Water Information Center, Inc., Huntington, New York.

Hewlet, John D. (1982). Principles of Forest Hydrologyp The University of ^^*GeorgLa* Press. Athens.

Chow, V.T., David R. Maidment, Larry W. Mays (1988). Applied Hydrology. McGraw-Hill.

VII. SPECIAL NOTES:

- Eighty percent attendance is required for anyone to be considered for supplementary examination.
- Homework assigned is due after one week. Late submissions will be penalized.
- To pass the course, a student must secure at least 60% in one of the tests.
- This is subject to any changes.

Students with special needs (e.g. physical limitations, visual impairments, hearing impairments, learning disabilities) are encouraged to discuss required accommodations confidentially with the instructor.

Your instructor reserves the right to modify the course as he/she deems necessary to meet the needs of students.