

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

COURSE OUTLINE


COURSE TITLE: WATER TRANSPORTATION SYSTEMS

CODE NO.: CIV 317-5 SEMESTER: IV

PROGRAM: WATER RESOURCES / ENVIRONMENTAL / CIVIL

AUTHOR: SUBHASH VERMA

DATE: FEBRUARY 1992 PREVIOUS OUTLINE DATED: NEW

APPROVED: 
DEAN, SCHOOL OF SCIENCES &
NATURAL RESOURCES

Feb 24 1992
DATE

WATER TRANS. SYSTEMS

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TOTAL CREDIT HOURS: 80

PREREQUISITE(S): WTR 330 - HYDRAULICS

I. PHILOSOPHY/GOALS:

Basic fluid flow principles and their application in the design and operation of wastewater collection systems, storm drainage systems and water supply and distribution will be discussed. Pump types, characteristics and operation to match the system being served will be included. System appurtenances including manholes, fire hydrants, valves, meters and pressure gauges will be covered.

II. STUDENT PERFORMANCE OBJECTIVES:

Upon successful completion of this course the student will be able:

1. To use the flow equations in both SI and US customary units.
2. To have a clear understanding of the factors governing a fluid flow system.
3. To estimate the sanitary flows based on land use.
4. To estimate peak flows based on storm and catchment characteristics.
5. To design the size of the conduit for carrying sanitary and storm flows.
6. To know the various components of a water distribution, wastewater collection, storm drainage and groundwater supply and pumping systems.
7. To perform a fire flow hydrant test and pressure test.
8. To do pipe network analysis.
9. To match pump and system characteristics.
10. To differentiate between various types of pumps and calculate the effect of change in speed or impeller diameter.
11. To input the data into the computer.
12. To run a simple computer program in network.

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III. TOPICS TO BE COVERED:

Approximate Number of Weeks

1. Review of Hydraulics

3

- 1.1 Definitions
- 1.2 Principles of fluid flow
- 1.3 Flow equations
- 1.4 System classifications
- 1.5 Open channel flow
- 1.6 Minor losses
- 1.7 Equivalent length technique

2. Pumps

4

- 2.1 Types
- 2.2 Operating characteristics
- 2.3 Cavitation, NPSH
- 2.4 Permissible suction lift
- 2.5 Affinity laws
- 2.6 Dynamic similarity
- 2.7 Total dynamic head
- 2.8 System head curve
- 2.9 Multiple pumps systems

3. Pipeline Analysis and Design

4

- 3.1 Single pipeline
- 3.2 Compound pipes, series and parallel
- 3.3 Pipe network
- 3.4 Hardy Cross method
- 3.5 Pseudo pipe analysis
- 3.6 Distribution system testing
- 3.7 Fire flow test

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III. TOPICS TO BE COVERED: Approximate Number of Weeks

4. Wastewater Collection System 2

- 4.1 System components
- 4.2 Flow estimation
- 4.3 Peaking factors
- 4.4 Design procedure

5. Storm Drainage System 3

- 5.1 System components
- 5.2 Estimating runoff
- 5.3 Simple catchment
- 5.4 Composite catchments
- 5.5 Urban catchments
- 5.6 Hydraulic design

V. EVALUATION METHODS:

The final mark will be based on the aggregate of four unit tests each carrying 25% weightage.

Grading: A+ = 90 - 100%
A = 80 - 89%
B = 70 - 79%
C = 60 - 69%

To pass this course a minimum aggregate of 60% is required.

This method of evaluation is subject to change.

VI. REQUIRED STUDENT RESOURCES:

1. MOE, (1981), Lecture notes, Sewer and Water Main Design Course.
2. Verma, S.C., (1992), Course Manual, Sault College, Sault Ste. Marie
3. Hammer, Mark J., (1986), Water and Wastewater Technology, 2nd Edition, John Wiley and Sons, Toronto.

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

1. Mott, Robert (1990), Applied Fluid Mechanics, Third Edition, Charles E. Merrel Publishing Company, Toronto.
2. Gupta, Ram S. (1989), Hydrology and Hydraulic Systems, Prentice Hall, Englewood Cliffs, New Jersey.
3. Peavy, H.S., Rowe et al. (1985), Environmental Engineering, McGraw-Hill Book Company, Toronto.
4. WPCP (1982), Design and Construction of Sanitary and Storm Sewers, Manual of Practice No. 9.
5. Tchobouoglous, G. (1981), Wastewater Engineering: collection and Pumping of Wastewater, McGraw-Hill Book Company, Toronto.

VIII. SPECIAL NOTES:

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.

Eighty percent attendance is required for successful completion of the course.