

SAULT COLLEGE OF APPLIED ARTS S> TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: WATER SUPPLIES S> TREATMENT
Code No.: WTR 201-5
Program: WATER RESOURCES/PULP & PAPER ENGINEERING TECHNOLOGY
Semester: IV VI
Date: MAY, 1987
Author: SUBHASH C. VERMA

New:

Revision:

APPROVED:


Chairperson

Date /

WATER RESOURCES
WTR 201-5
WATER SUPPLIES & TREATMENT

WATER SUPPLIES & TREATMENT

WTR 201-5

Course Name

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GOALS:

To present basic knowledge and practices, theories and applications relevant to sources of water supplies, treatment processes, quality parameters and plant operations.

OBJECTIVES;

1. Understand the need for the production of highest quality of water.
2. Understand the various types of bacterial and physiochemical characteristics of water as parameters of water quality.
3. Know drinking water standards.
4. Know the sources of water for water supply and their quality in general.
5. Know about the various unit operations (physical, chemical and biological) commonly used in the treatment of water.
6. Know the role of a plant operator in maintaining the quality of water under different situations of plant loadings and raw water quality.
7. Become familiar with various treatment processes and systems. Know design criteria/procedures for flocculation and sedimentation tanks, filters and chemical feeding equipment.
8. Develop skills for making fast and accurate computations needed for design as well as operational parameters used in process control.
9. Carry out laboratory analysis for the turbidity, colour, pH, alkalinity, coagulant effectiveness, chlorine and flouride residual, hardness, iron, manganese and total dissolved solids.

10. In the operation of a water treatment plant, **know** the following:
- a. To prepare chemical solutions for dosage rate selected based on jar test and other quality parameters.
 - b. To calculate feed rate for a selected flow rate and adjust feed pump to yield the required output.
 - c. To observe colour turbidity, pH, chlorine residual and hardness of raw and finished water.
 - d. To adjust different controls, including backwashing operation.

EVALUATION; BASIS OF FINAL MARK

Laboratory/Field Exercises and Problems	25%
Mid-Term Examination	25%
Quizzes/Tests	10%
Final Examination	40%

- NOTE:
1. Late submissions will be penalized.
 2. The above distribution of marks is subjected to change.
 3. A passing grade will be based on a composite grading of 60%. Students obtaining a composite grading of 55-60% may be allowed a supplementary examination.

TEXTBOOKS:

Hammer, Mark J. Water and Wastewater Technology (SI Version), 2nd Edition, John Wiley and Sons, Toronto, 1977.

Ministry of the Environment, Laboratory Skills for Plant Operators, Vol. 2, 135 St. Clair Avenue West, Toronto, Ontario.

REFERENCES;

Fair, Gordon Maskey, Geyer, John C, Elements of Water Supply and Wastewater Disposal, 2nd edition, John Wiley and Sons, Toronto, 1971.

Viessman, W. Jr., Hammer, M. J., Water Supply and Pollution Control, 4th edition. Harper and Row Publishers, New York, 1985.

Tchobanoglous, G., E.D. Schroeder, Water Quality, Addison-Wesley Publishing Company, Don Mills, Ontario, 1985.

Peavy, H.S., D.R. Donald, G. Tchobanoglous, Environmental Engineering, McGraw Hill Book Company, Toronto, 1985.

TAPPI, Water Supply and Treatment, State-of-the-Art, Technical Association of the Pulp and Paper Industry, One Dunwoody Park, Atlanta, GA, 30338, 19'

COURSE OUTLINE;

Water quality and pollution, water processing, sedimentation, filtration, chemical treatments, softening and desalination, chlorination, flouridation, operation of water works.

TOPIC	NO. OF WEEKS
1. Water quality and standards	2
1.1 Bacteriological characteristics	
1.2 Bacteria testing procedure	
1.3 Physical and Chemical characteristics	
1.4 Drinking water standards	
2. Water Processing	11
2.1 Introduction to water supply systems	
2.2 Sources of water supplies	
2.3 Unit operations of water treatment	
2.4 Surface water and ground water treatment systems	
2.5 Disposal of waste from water treatment processes	
2.6 Mixing and flocculation	
2.7 Chemical feeders	
2.8 Sedimentation, clarifiers	
2.9 Filtration	
2.10 Iron and manganese removal	
2.11 Hardness removal	
2.12 Chlorination	
2.13 Flouridation	
2.14 Turbidity and odour control	
2.15 Removal of dissolved salts	
2.16 Corrosion control and stabilization	
3. Operation of water treatment, plant and distribution	2
3.1 Groundwater treatment plant	
3.2 River water treatment plant	
3.3 Water quality control	
3.4 Water distribution maintenance and surveillance	
3.5 Water rates	

LABORATORY EXERCISES

1. Colour and turbidity
2. Alkalinity and pH
3. Jar test
4. Hardness and aggressive index
5. Chlorine/fluoride residual
6. Design parameters of treatment devices
7. Plant operation and process control

NOTE: Depending upon time and equipment limitation, some exercises may be replaced or will be covered in other courses.