

WASTEWATER TREATMENT

WTR 226-5

COURSE NAME

CODE NO.

TOTAL CREDIT HOURS: 75

?REREQUISITE(S): NONE

I. PHILOSOPHY/GOALS:

To present basic knowledge and practices, theories, and applications relevant to wastewater flows and characteristics, treatment processes, and plant operations.

II. STUDENT PERFORMANCE OBJECTIVES:

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

1. Assess and evaluate wastewater flows and characteristics.

Perform basic designs of unit treatment processes, including preliminary settling facilities, aerobic biological processes, secondary settling tanks.
3. Determine plant operation requirements, including process control, performance evaluation, and maintenance.
4. Perform laboratory tests and analyses relevant to plant performance.
 - a) Determine the organic and hydraulic loading based on BOD, SS and average flow.
 - b) Perform the settling test and make decision on the flow of return sludge.
 - c) Determine the SS, respiration rate and population of different organisms in the mixed liquor.
 - d) Set air flow rate to maintain the desired level of dissolved oxygen in the mixed liquor.
 - e) Estimate the amount of sludge to be wasted, based on the selected solids retention time.
 - f) Observe the sludge blanket and check loading both for primary and secondary clarifiers.

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III. TOPICS TO BE COVERED:

| TOPICS | NO. OF WEEKS |
|-----------------------------------------------------|--------------|
| 1. <u>WASTEWATER FLOWS AND CHARACTERISTICS</u> | |
| 1.1 Domestic Wastewater | 2 |
| 1.2 Industrial Wastewater | |
| 1.3 Infiltration and Inflow | |
| 1.4 Municipal Wastewater | |
| 1.5 Evaluation of Wastewater | |
| 2. <u>WASTEWATER PROCESSING</u> | |
| 2.1 Unit Operations | 10 |
| 2.2 Preliminary Treatment | |
| 2.3 Primary Treatment | |
| 2.4 Secondary Treatment | |
| - biological filtration | |
| - stabilization ponds | |
| - rotating biological contactors | |
| - biological aeration | |
| - extended aeration | |
| - step aeration | |
| - conventional | |
| - contact stabilization | |
| - high rate | |
| 2.5 Characteristics and Quantities of Waste Sludges | |
| 3. <u>OPERATION OF WASTEWATER SYSTEMS</u> | |
| 3.1 Treatability Studies | 2 |
| 3.2 Performance Evaluation of Treatment Plants | |
| 4. <u>ADVANCED TOPICS</u> | 1 |

LIST OF EXPERIMENTS

1. Suspended Solids (SS)
2. Total Solids (TS)
3. Biochemical Oxygen Demand (BOD)
4. Oxygen Uptake Rate (OUR)
5. Settling Test (SVI and SDI)
6. Hydraulic Parameters
7. Operation and Process Control

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

The final mark to be assigned will be the higher of either:

- a) final examination, or
- b) weighted mark based on aggregate as shown below

| | |
|-----------------------------|-----|
| Assignments/Laboratory Work | 25% |
| 3 Unit Tests (25% each) | 75% |

GRADING:

| | | | | |
|----|---|----|---|-----|
| A+ | = | 90 | - | 100 |
| A | = | 80 | - | 89 |
| B | = | 70 | - | 79 |
| C | = | 60 | - | 69 |

A passing grade will be based on a minimum composite grading of 60%. Students obtaining a composite grading of 55-59% may be allowed to complete a supplementary examination.

V. REQUIRED STUDENT RESOURCES:

Water and Wastewater ^ Technology (SI Version) by Mark J. Hammer, John Wiley & Sons, 2nd Edition.

Laboratory Skills for Plant Operators, Vol. 2 - Ministry of the Environment, 135 St. Clair Ave. W., Toronto, Ontario, M4V 1P5.

Laboratory Manual - WTR226, by S. Verma; Sault College, June 1992.

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

Standard Methods, by AWWA-WPCF-APHA, 1015 15th Street N.W., Washington, D.C. 20005

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

Environmental Engineering, Peavey, H., Donald, R., Tchobanoglous, G, McGraw-Hill Book Company, Toronto

Water Supply and Pollutional Control, Viessman, Warren, Hammer, M.J., Fourth Edition, Harper and Row Publishers

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VII. SPECIAL NOTES:

Eighty percent attendance is required for anyone to be considered for supplementary examination.

Assignments are due one week after they are assigned. Late submissions will be penalized.

If required, changes will be made. However, students will be notified prior to any changes.