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**COURSE PREFIX/NO:** EVT 110  
**COURSE TITLE:** Introduction to Treatment Facilities  
**LECTURE HOURS:** 3.0  
**LAB HOURS:** 0.0

[Distance Learning Attendance/VA Statement](#)  
[Textbook Information](#)

### **COURSE DESCRIPTION**

This course covers the physical, chemical, and biological principals of operation of water and wastewater treatment systems. The basic unit processes, control parameters, and mathematical problem solving related to collection systems, treatment facilities, and distribution systems are introduced.

### **COURSE COMPETENCIES/PERFORMANCE OBJECTIVES**

Upon successful completion of this course, students will be able to meet the following objectives:

#### **Module 1: Introduction to Water Treatment Processes**

1. Explain the biological components of water.
2. Explain the reasons why the biological components of water need to be controlled.
3. Explain how the biological components of water are controlled in the water treatment process

#### **Module 1 Objectives**

- The hydrologic cycle and how it relates to water and wastewater.
- How humans intervene in the hydrologic cycle.
- The basic sciences that are the foundation for understanding water supply and pollution control.
- The overall reason for water and wastewater treatment.
- Licensing and credit procedures.

#### **Module 2: Water Chemistry and Laboratory Chemical Analysis**

1. Understand the physical, chemical and biological principals of water chemistry.
2. Understand lab analysis used to determine the concentrations in the water.

#### **Module 2 Objectives**

- The structure of water.
- The behavior of solutes in water.
- The effects of pH DO, temperature, gas solubility, alkalinity in surface water.
- Colloid, coagulation, organic compounds and organic matter in wastewater.
- The principals and methodologies for the following analysis:
  - Standard Solutions
  - Hydrogen Ion Concentration
  - Alkalinity and Acidity
  - Hardness
  - Iron and Manganese

- Color
- Turbidity
- Jar Testing
- Fluoride
- Chlorine
- Nitrogen
- Phosphorus
- Dissolved Oxygen
- Solids

### **Module 3: Water Biology**

1. Discuss the microbiology that affects drinking water.
2. Define water borne diseases and the importance of treatment to prevent these types of diseases

#### **Module 3 Objectives**

- The following organisms and their importance in water treatment:
  - Identify bacteria and fungi in water.
  - Explain viruses that are in water.
  - Identify algae, protozoa, and multicellular animals found in water.
  - Define water borne disease.
  - Discuss the definition of indicator organisms.
  - Define and explain the use of Biochemical Oxygen Demand.

### **Module 4: Water Quality and Pollution**

1. Understand the importance of water quality.
2. Understand how today's society introduces contaminants in the water.
3. Understand what governmental regulations have been implemented to protect our water quality.

#### **Module 4 Objectives**

- The criteria defining quality of surface water.
- The classifications of contamination and toxic agents in flowing waters.
- The source of inorganic suspensions found in flowing waters.
- Eutrophication and its prevention as it relates to lakes.
- Groundwater use and contamination.
- NPDES and its implications to wastewater treatment.
- The significance and maintenance of microbiological quality of drinking water.
- The significance and maintenance of chemical quality of drinking water.
- Chemical drinking water standards established by the EPA, including the Safe Water Drinking Act.

### **Module 5: The Water Treatment Process and Water Distribution System**

1. Discuss the following concepts: the overall primary processes of a surface water treatment plant, the formation of trihalomethanes, the use of other types of treatment techniques and how the regulatory agency conducts a sanitary survey.
2. Understand the water distribution system and how it is operated and maintained.

#### **Module 5 Objectives**

- The objective of municipal water treatment and common water sources.
- The primary process in Surface Water Treatment.
- The following treatment processes and/or equipment:
  - Raw water pumping stations
  - Pretreatment-Mixing and flocculation

- Pretreatment-Sedimentation
- Filtration
- Flow control
- Clarification
- Coagulants and coagulant aids
- Turbidity
- The process of taste and odor control
- Iron removal, manganese removal, and precipitation softening
- Water Stabilization
- Fluoridation and why its needed in water treatment
- Chlorine Disinfection and safety
- Other types of disinfections.
- Trihalomethanes.
- Groundwater Disinfection.
- Reverse osmosis and other new treatment techniques.
- The sources of wastes in water treatment
- Dewatering and disposal of wastes from water treatment.
- A Sanitary Survey
- The facilities and equipment of the water distribution system and how they are tested and maintained.

## **Module 6: The Wastewater Characteristics, the Wastewater Treatment Process and the Wastewater Collection System**

1. Describe the sources and regulations of wastewater.
2. Explain the wastewater treatment plant processes.
3. Explain the wastewater collection systems

### **Module 6 Objectives**

- Understand the following sources of wastewater and how they are regulated and treated:
  - Domestic or sanitary wastewater derives.
  - Industrial wastewater.
  - Storm water runoff
  - Infiltration and inflow.
  - The evaluation of wastewater through lab analysis.
  - The history of wastewater treatment.
  - The four major steps in wastewater treatment.
  - Wastewater plant design.
  - The following wastewater treatment processes and equipment:
    - Preliminary treatment
    - Pumping stations at the wastewater plant
    - Sedimentation
    - Clarifiers
    - Biological filtration
    - Biological aeration and oxygen transfer
    - The types of activated sludge processes
    - The types of lagoon systems
    - Septic tank systems
    - Waste sludges
    - Aerobic versus anaerobic digesters
    - Sludge drying beds
    - Filtration of sludge
    - Composting, incineration and drying of sludges

- Wastewater Collection Systems.
- Regulations and Standards affecting the wastewater collection systems.
- Inspection and testing
- Operation and maintenance
- Regulatory reporting

### **Module 7: Worker Health and Safety**

1. Explain OSHA safety regulations that have been established at both the water and wastewater treatment facilities

#### **Module 7 Objectives**

- The Safety polices established by OHSA for chemical handling at water and wastewater facilities.
  - OHSA
  - HAZMAT and related topics
  - Laboratory Safety
  - Other related topics.

#### **MINIMAL STANDARDS**

Minimal standards of performance for receiving credit for the course are indicated by 60% accuracy on all evaluation instruments (see evaluation strategies) which address the performance objectives listed above.

#### **COURSE REQUIREMENTS**

##### **Attendance Policy:**

Students are responsible for attending meetings in the course until they have completed all course requirements. Students are responsible for all material covered and for all assignments made in all classes. Students who are absent from a course more than 10% of the total contact hours assigned will be withdrawn. Since this course has a total of 48 contact hours, any student who is absent more than 5 contact hours total may be dropped in accordance with the attendance policy of York Technical College. See attached Instructor's Individual Policy for more information.

##### **Withdrawal from the course:**

A student may withdraw from a course after the drop/add period until midterm with a grade of "W." Withdrawals after midterm will result in either a grade of "W" or "WF" depending upon the student's academic performance and attendance in the course at the time of the withdrawal.

##### **Student Conduct**

Students are expected to conform to all standards of conduct as specified in the York Technical College Handbook and Catalog. Students found guilty of academic dishonesty such as cheating or plagiarism will be given a grade of zero on that assignment and may be subject to further disciplinary action.

## **EVALUATION STRATEGIES/GRADING**

Grades will be determined as described below:

Module 1 Test	12.5%
Module 2 Test	12.5%
Module 3 Test	12.5%
Module 4 Test	12.5%
Module 5 Test	12.5%
Module 6 Test	12.5%
Module 7 Test	12.5%
Final Exam	12.5%
<b>TOTAL</b>	<b>100.0%</b>

The grading scale is as follows:

A = 90-100

B = 80-89

C = 70-79

D = 60-69

F = Below 60

W = Withdrawal before midterm

A statement of the instructor's additional requirements and/or policy may also be included in the course materials.

## **ENTRY-LEVEL SKILLS**

A student entering this course must possess reading comprehension and writing skills on at least the 10<sup>th</sup> grade level.

**PREREQUISITE COURSES** – None; CHM 101 or CHM 110 is recommended.

**CO-REQUISITES** - NONE

**Disabilities Statement:** Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Special Resources Offices (SR) at 803-327-8007 in the 300 area of Student Services. The SRO coordinates reasonable accommodations for students with documented disabilities.

EFFECTIVE: FA2006