

**WTR 103 Course Outline as of Fall 2017****CATALOG INFORMATION**

Dept and Nbr: WTR 103 Title: INTRO WTR SCI OPERATORS

Full Title: Introduction to Water Sciences for Operators

Last Reviewed: 1/26/2015

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	1.50	Lecture Scheduled	1.50	17.5	Lecture Scheduled	26.25
Minimum	1.50	Lab Scheduled	0	8	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	1.50		Contact Total	26.25
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 52.50

Total Student Learning Hours: 78.75

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly: ENVT 103

**Catalog Description:**

Introduction to chemistry, biology, bacteriology, hydraulics, and electricity as related to the fields of water treatment technology, water distribution technology, and waste water treatment technology. Introduces concepts applied in certification preparation courses.

**Prerequisites/Corequisites:****Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: Introduction to chemistry, biology, bacteriology, hydraulics, and electricity as related to fields of water treatment technology, water distribution technology, and waste water treatment technology. Introduces concepts applied in certification preparation courses. (Grade Only)

Prerequisites/Corequisites:

Recommended:

Limits on Enrollment:

Transfer Credit:

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>	Effective:	Inactive:
<b>CSU GE:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>IGETC:</b>	<b>Transfer Area</b>	Effective:	Inactive:
<b>CSU Transfer:</b>		Effective:	Inactive:
<b>UC Transfer:</b>		Effective:	Inactive:

**CID:**

**Certificate/Major Applicable:**

Certificate Applicable Course

## **COURSE CONTENT**

### **Outcomes and Objectives:**

1. Compute and compare the variables in the flow equation  $Q=VA$ .
2. Explain, demonstrate, and convert between water pressure and height of water column.
3. Demonstrate, analyze, and estimate static pressure at any elevation from a water distribution system profile.
4. Define, demonstrate, analyze, and compare two ways of imparting kinetic energy to water.
5. Explain and compare two ways of dissipating kinetic energy from water.
6. Define, demonstrate, and differentiate primary, secondary, and tertiary wastewater treatment.
7. Compare and contrast aerobic and anaerobic wastewater treatment.
8. Describe, assess, and summarize aqueous ionization of chlorine, ammonia, and carbon dioxide.
9. Explain and evaluate the relationship between disinfection and coliform testing.
10. Describe, explain, demonstrate, and compare and measure volts, ohms, and amps.
11. Summarize Ohm's Law, identify the variables, and solve for each.
12. Describe and interpret electrical "ground".
13. Describe, demonstrate, and differentiate AC and DC.
14. Explain and evaluate induction and its use in transformers.
15. Describe, differentiate, and evaluate drinking water MCLs (maximum contaminant levels) for chemical impurities.
16. Describe, measure, and evaluate NPDES (National Pollution Discharge Elimination System) permit effluent limits for chemical pollutants.

**Topics and Scope:**

- I. Flow Definition and Equation
- II. Pressure Head (height of water column)
  - A. Elevation
  - B. Static pressure
  - C. Water distribution system profile
- III. Velocity Head (kinetic energy)
  - A. Imparting
  - B. Dissipating
- IV. Wastewater Treatment
  - A. Primary
  - B. Secondary
    - 1. aerobic
    - 2. anaerobic
    - 3. photosynthesis
  - C. Tertiary
  - D. Disinfection
    - 1. coliform testing
    - 2. chlorination
    - 3. ultraviolet radiation
- V. Aqueous Ionization
  - A. Ammonia
  - B. Carbon dioxide
  - C. Chlorine
- VI. Electricity
  - A. Current, voltage and resistance
  - B. Direct and alternating current
  - C. Ground
  - D. Induction
  - E. Ohm's law
- VII. Impurities in Water
  - A. Maximum concentration limits
  - B. Effluent limitations

### Assignment:

1. Reading, approximately 10 - 20 pages per week, based on eight week course.
2. Homework problems related to hydraulic, electrical and chemistry calculations.
3. Quizzes (4-6); final exam.

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.

Writing  
0 - 0%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems

Problem solving  
25 - 45%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Skill Demonstrations  
0 - 0%

**Exams:** All forms of formal testing, other than skill performance exams.

Multiple choice, True/false, Matching items, Completion

Exams  
40 - 60%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Class participation.

Other Category  
10 - 20%

**Representative Textbooks and Materials:**

Water Treatment: Principles and Design; Crittendon, Trussell, Hand, Howe and Tchobanoglous; Wiley; 2012

Water Distribution Operator Training Handbook; Lauer (Editor); 4/e; 2013

Instructor prepared materials