

Course Outline

COURSE: WTRM 202 **DIVISION:** 50 **ALSO LISTED AS:** WTRM 102

TERM EFFECTIVE: Summer 2024 **CURRICULUM APPROVAL DATE:** 06/11/2024

SHORT TITLE: WATER/WASTEWATER MATH 1

LONG TITLE: Beginning Water, Wastewater, Distribution Math

<u>Units</u>	<u>Number of Weeks</u>	<u>Type</u>	<u>Contact Hours/Week</u>	<u>Total Contact Hours</u>
3	18	Lecture:	3	54
		Lab:	0	0
		Other:	0	0
		Total:	3	54

Out of Class Hrs: 108.00
 Total Learning Hrs: 162.00

COURSE DESCRIPTION:

This course covers basic math concepts used in the water and wastewater distribution industry. Topics include industry standard formulas, conversion factors, fractions, decimals, percentages, ratios, area and volume. This course was previously listed as WTRM 102. **ADVISORY:** Skills equivalent to those in an Elementary Algebra course.

PREREQUISITES:

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

- 02 - Lecture and/or discussion
- 05 - Hybrid
- 71 - Dist. Ed Internet Simultaneous
- 72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Apply mathematics such as addition, subtraction, multiplication, and division with whole numbers, decimals, and fractions used in the Water Industry.
2. Utilize industry standard formula sheets and conversion factors to successfully solve math problems.

COURSE OBJECTIVES:

By the end of this course, a student should:

1. Apply basic math concepts as they relate to water industry standard calculations.
2. Identify and apply the formulas needed to successfully solve word problems, including manipulating conversion factors to convert Cubic Feet to Gallons to Pounds. Solve problems using the Pounds Formula.
3. Identify and apply the formulas needed to successfully solve word problems, including calculating the surface area in square feet of tanks and vessels and convert cubic feet into cubic yards.
4. Identify and apply the formulas needed to successfully solve word problems, including calculating area, volume, gallons, and cubic yards of trapezoid shaped canals.
5. Identify and apply the formulas needed to successfully solve word problems that use calculation for linear feet measurements, perimeters, and circumferences of tanks, vessels, and weirs.
6. Identify and apply the formulas needed to successfully solve word problems that use calculation for area in acres, volume in acre feet and convert square feet into acres, and cubic feet into acre feet.
7. Identify and apply the formulas needed to successfully solve word problems to calculate average industrial, commercial, and domestic water uses, such as gallons per day per-capita.
8. Identify and apply the formulas needed to successfully solve word problems to calculate PSI in a well, tank or vessel.
9. Identify and apply the formulas needed to successfully solve word problems to calculate weir overflow rate in gallons/day per linear foot of weir.
10. Identify and apply the formulas needed to successfully solve word problems by calculating forward and/or backwards.

COURSE CONTENT:

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5 Hours

Content: Review of basic mathematics: Addition; Subtraction; Multiplication; Division, with whole numbers, fractions, decimals and percentages.

6 Hours

Content: Review Industry Standard Formula Sheets used and provided when taking State Certification Exams. Identification of Conversion Factors used to convert Cubic Feet to Gallons to Pounds. Identify the Pounds Formula.

6 Hours

Content: Computation of Surface Area in Square Feet of Square, Rectangular, Circular Tanks and the cross-section of a Trapezoidal shaped canal. Computation of Surface Area in Acres of Square, Rectangular, Circular Tanks.

6 Hours

Content: Computation of Volume in Cubic Feet of Square, Rectangular, Circular tanks and Trapezoidal shaped canals. Computation of Volume in Acre Feet of Square, Rectangular, Circular tanks and Trapezoidal shaped canals. Computation of Cubic Yards of Square, Rectangular, Circular tanks and Trapezoidal shaped canals.

COURSE CONTENT(CONTINUED):

6 Hours

Content: Computation of Linear Feet measurements, Perimeters, and Circumferences of tanks, vessels, and weirs. Calculate Percent (%) Removal/Efficiency of treatment processes.

Calculate dose, demand, residual in chemical application. Utilize the pounds formula to calculate pounds of chemicals, sludge and bacteria in the system. Calculate surface loading rate in gallons/day per square foot.

6 Hours

Content: Computation of Average Industrial, Commercial, and Domestic Water Uses. Identify Peak Flow, Minimum Flow, and calculate Average Daily, Monthly, and Annual Flows. Calculate Gallons per Day per-capita. Calculate Population Equivalents. Identify peak flow, minimum flow, and calculate average daily flow. Calculate average industrial, commercial, and domestic water uses. Calculate gallons per day per-capita. Calculate population equivalents. Calculate detention time for tanks and vessels.

6 Hours

Content: Calculate PSI in Wells, Tanks, and Vessels. Convert Feet of Head into PSI. Calculate Well Draw-down, Specific Yield, Pumping Water Level, and Static Water Level. Perform Temperature Conversions for Degrees C to Degrees F, and Convert Degrees F to Degrees C. Calculate PSI in a well, tank or vessel. Convert feet of head into PSI. Calculate well draw-down. Calculate temperature conversions from degrees Fahrenheit to Centigrade, and Centigrade to Fahrenheit.

6 Hours

Content: Computation of Detention Time for Tanks and Vessels. Calculate Velocity of moving water. Calculate Surface Loading Rates in Gallons/Day per Square Foot. Calculate Weir Overflow Rates in Gallons/Day per Linear Foot of Weir.

Calculate weir overflow rate in gallons/day per linear foot of weir and the velocity of moving water.

5 Hours

Content: Manipulation of the Formulas above Forward and Backwards.

2 Hours

Final: Comprehensive Final Exam solving word problems.

METHODS OF INSTRUCTION:

Lectures and Discussions, Visual Aids, Demonstrations

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours: 36

Assignment Description: Review textbook examples and complete homework.

Required Outside Hours: 36

Assignment Description: Study for quizzes and exams.

Required Outside Hours: 36

Assignment Description: Solve math word problem worksheets.

METHODS OF EVALUATION:

Writing assignments

Percent of total grade: 0.00 %

Course is primarily computational

Problem-solving assignments

Percent of total grade: 30.00 %

Percent range of total grade: 20% to 40 % Homework Problems, Quizzes, Exams

Objective examinations

Percent of total grade: 50.00 %

Percent range of total grade: 30% to 50% Multiple Choice, True/False, Other: Math Computation

Other methods of evaluation

Percent of total grade: 20.00 %

REPRESENTATIVE TEXTBOOKS:

Mathematics Manual for Water and Wastewater Treatment Plant Operators, Second Edition, or other appropriate college level text. , Frank R. Spellman, CRC Press, 2014.

ISBN: 9781482224214

Rationale: NOTE: This is a standard text that is used in the water industry.

11th Grade Verified by: Dana Young

Basic Math Concepts for Water and Wastewater Plant Operators, 2nd Edition by Joanne K. Price; Technomic Publishing Company; ISBN: 978-0877628088

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Not Transferable

Not Transferable

UC TRANSFER:

Not Transferable

Not Transferable

SUPPLEMENTAL DATA:

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN:

CAN Sequence:

CSU Crosswalk Course Department:

CSU Crosswalk Course Number:

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: C

Maximum Hours:

Minimum Hours:

Course Control Number: CCC000588723

Sports/Physical Education Course: N

Taxonomy of Program: 095800