GAVILAN COLLEGE

5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: WTRM 210   DIVISION: 50   ALSO LISTED AS: WTRM 110

TERM EFFECTIVE: Fall 2019   CURRICULUM APPROVAL DATE: 11/13/2018

SHORT TITLE: ADV WTR/WASTEWATER DIST MATH

LONG TITLE: Advanced Water/Wastewater/Distribution Math

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

COURSE DESCRIPTION:

This course is a continuation of the Beginning Water/Wastewater Mathematics course WTRM 202 and covers advanced math concepts used in the Water/Wastewater/Distribution industry. Topics include industry standard formulas, conversion factors, MCRT, SVI, waste/return, horsepower, well drawdown, capacitance, yield, belt press cake/filtrate, SDI, sludge age, gas production and digestion rates. Previously listed as WTRM 110. ADVISORY: Math 205 Elementary Algebra and WTRM 202 Beginning Water/Wastewater Mathematics.

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
        72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:

1. Apply mathematics such as addition, subtraction, multiplication, and division with whole numbers, decimals, and fractions used in the Water Industry to: Trickling Filters and Rotating Biological Contactor math, Waste Treatment Ponds math, Sludge Production and Thickening calculations, and Sludge Dewatering and Disposal math.

Measure of assessment: Quizzes, Exams, Homework Problems

Year assessed, or planned year of assessment: 2017

Semester: Fall

2. Utilizing Industry Standard formula sheets and conversion factors: convert Cubic Feet to Gallons to Pounds and complete Activated Sludge, Chemical Dosage, Sludge Digestion, Laboratory, and Water Treatment Filter calculations.

Measure of assessment: Quizzes, Exams, Homework Problems

Year assessed, or planned year of assessment: 2017

Semester: Fall

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 11/13/2018

3 Hours

Content: Apply mathematics such as addition, subtraction, multiplication, and division with whole numbers, decimals, and fractions used in the Water Industry. Review basic math concepts covered in the beginning class.

Student Performance Objectives: Apply basic math concepts as they relate to Industry standard calculations.

3 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.

Student Performance Objectives: Identify formulas needed to successfully solve word problems. Manipulate conversion factors to convert Cubic Feet to Gallons to Pounds. Solve problems using the Pounds Formula.

4 Hours

Content: Trickling Filters and Rotating Biological Contactor Math. Hydraulic Loading, Organic Loading, BOD and Suspended Solids Removed, Re-circulation Ratios, and Percent Removal/Efficiency.

Student Performance Objectives: Outline formulas needed to successfully solve word problems for unit process control.

6 Hours

Content: Activated Sludge Calculations. BOD and COD Loading, Solids Inventory, F/M Ratio, Sludge Age, SVI, MCRT, Return Sludge and Sludge Wasting Rates, Pumping Rates, and Oxidation Ditch Detention Time.

Student Performance Objectives: Identify formulas needed to successfully solve word problems for unit process control.

6 Hours

Content: Waste Treatment Ponds Math. BOD Loading, Organic Loading, BOD Removal Efficiency, Hydraulic Loading, Population Loading and Equivalent, Detention Time.

Student Performance Objectives: Outline formulas needed to successfully solve word problems for unit process control.

6 Hours

Content: Chemical Dosage Calculations. Chemical Feed Rate, Dose-Demand-Residual, Percent Strength of solution, Mixing Solutions of Different Strengths, Chemical Feed Pump Settings, Dry Chemical Feed Settings.

Student Performance Objectives: Identify formulas needed to successfully solve word problems for unit process control.

6 Hours

Content: Sludge Production and Thickening Calculations. Primary and Secondary Solids production, Percent Solids, Sludge Thickening and Volume Changes, Gravity Thickening Calculations, DAF Thickening Calculations, Centrifuge Thickening Calculations.

Student Performance Objectives: Explain formulas needed to successfully solve word problems for unit process control.

6 Hours

Content: Sludge Digestion Calculations. Sludge Volume Pumped, Pumping Times, Volatile Solids Loading, VA/Alkalinity Ratio, Lime Neutralization, Percent Reduction, Digester Gas Produced, Digestion Time, Air Requirements and Oxygen Uptake.

Student Performance Objectives: Identify formulas needed to successfully solve word problems for unit process control.

6 Hours

Content: Sludge Dewatering and Disposal Math. Filter Press, Belt Filter Press, Vacuum Filter Press Dewatering Calculations, Sand Drying Bed Calculations, and Composting Calculations.

Performance Objectives: Outline formulas needed to successfully solve word problems for unit process control.

6 Hours

Content: Laboratory Calculations. Water Treatment Filter Calculations. BOD, Settleability, Settleable Solids, Sludge Total and Volatile Solids, Suspended Solids and Volatile Solids, Temperature. Filtration Rates, Filter Loading Rates, Filter Runs, Filter Backwash Rates. Horsepower, Wire to Water HP Calculations, Kilowatt Determinations, Power Costs.

Student Performance Objectives: Identify formulas needed to successfully solve word problems for unit process control.

2 Hours

METHODS OF INSTRUCTION:
Lecture, Discussion, Multimedia, Demonstration

METHODS OF EVALUATION:
Writing assignments
Percent of total grade: 0.00 %
Course is primarily computational
Problem-solving assignments
Percent of total grade: 0.00 %
Percent range of total grade: 25 % to 45 % Homework Problems Quizzes Exams Other: Class Participation
Skill demonstrations
Percent of total grade: 0.00 %
Percent range of total grade: 10 % to 25 % Class Performance/s
Objective examinations
Percent of total grade: 0.00 %
Percent range of total grade: 30 % to 50 % Multiple Choice True/False Other: Math Computation
OUT OF CLASS ASSIGNMENTS:
Required Outside Hours: 78
Assignment Description: Out-of-Class Assignments: For each topic, students will review in class and text book examples to complete hand-out homework assignments.
Required Outside Hours: 26
Assignment Description: Study for quizzes and exams.

REPRESENTATIVE TEXTBOOKS:
Required Representative Textbooks
Recommended Representative Textbooks

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

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

ISBN: 9781482224214

Reading Level of Text, Grade: 11th Verified by: Dana Young

Required Other Texts and Materials

Basic Math Concepts for Water and Wastewater Plant Operations, 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

      UC TRANSFER:

          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: 3

Minimum Hours: 3

Course Control Number: CCC000530892

Sports/Physical Education Course: N

Taxonomy of Program: 095800