

Veolia Wastewater Operator Training Series – Wastewater Basic Math Concepts

Learning Objectives

This course covers a general overview of Wastewater Basic Math. At the end of the course the student should be able to:

- Describe and perform the various steps involved in Dimensional Analysis
- Describe and perform the various steps involved in Unit Conversions
- Describe and perform the various steps involved in Geometric and Linear Measurement
- Describe and perform the various steps involved in determining Significant Figures.
- Describe and perform the various steps involved in Exponents
- Describe and perform the various steps involved in Square Root calculations

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

This course covers the various basic math concepts followed by a quiz to assess your preparation for the Fundamentals 1 training course. Topics Include: Box Method, Dimensional Analysis, Conversions, Measurements, Significant Figures, Exponents and Square Root.

Course Outline

Wastewater Math & Quiz

1.5 Hrs

Total Hours

1.5 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Wastewater Math & Theory

Learning Objectives

This course covers a general overview of Wastewater Math and Theory. At the end of the course the student should be able to:

- Describe the general involved in Wastewater Treatment
- Describe and perform the various steps involved in Wastewater Chemistry
- Describe and perform the various steps involved in Wastewater Biology
- Describe and perform the various steps involved in Wastewater Hydraulics and Power
- Describe and perform the various steps involved in Unit Conversions
- Describe and perform the various steps involved in Geometric and Linear Measurement
- Describe and perform the various steps involved in Exponents
- Describe and perform the various steps involved in Square Root calculations

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

This course consists of a summary of various wastewater topics followed by a quiz to assess your preparation for the Solids Process Course and the Fundamentals 1 training course. Topics include: General Refresher, Chemistry, Biology, Hydraulics, Power, Theory and Math.

Course Outline

Wastewater Math, Theory & Quiz

3.5 Hrs

Total Hours

3.5 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, sequence and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Introduction to Wastewater

Learning Objectives

This course covers an Introduction to Wastewater Treatment. At the end of the course the student should be able to:

- Predict the fate of different nitrogen and phosphorus species during biological and chemical treatment.
- Interpret chemical equations, predict the composition of ionic compounds, convert moles to milligrams per liter (mg/L), and calculate chemical dosages from balanced chemical equations.
- Explain the steps involved in nitrification, denitrification, and enhanced biological phosphorus removal (EBPR) and identify the microorganisms responsible for each transformation.
- List the stoichiometric requirements for and products of nitrification, denitrification, EBPR, and chemical phosphorus removal.
- Identify the most important process control parameters for nitrification, denitrification, chemical phosphorus removal, and EBPR.
- Describe the effects of environmental variables (pH, dissolved oxygen [DO], etc.) on each biological process.

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quiz are based on the Introduction to Wastewater. Topics Include: Introduction to Wastewater, Regulations, Liquid Processes, Solids Processes, and WRRFs.

Course Outline

Introduction to Wastewater & Quiz

2.5 Hrs

Total Hours

2.5 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Wastewater Characteristics

Learning Objectives

This course covers Wastewater Characteristics. At the end of the course the student should be able to:

- List the significant sources of wastewater for a domestic water resource recovery facility (WRRF)
- Evaluate the effect of activities in the service area on flow patterns at the WRRF
- Explain how the size of the collection system and population served affect diurnal flow patterns
- List and define additional components of domestic wastewater
- Estimate flows and loads to a WRRF from population data; calculate per capita generation rates
- Convert nitrogen and phosphorus compounds to expressions as N and P, respectively

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quiz are based on the equipment, operations and maintenance utilized in Wastewater Characteristics. Topics include: WW Sources, Flow Variations, Influent Characteristics, and Per Capita Generation.

Course Outline

Wastewater Characteristics	1.5 Hrs
Total Hours	1.5 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Preliminary Treatment

Learning Objectives

This course covers Wastewater Preliminary Treatment. At the end of the course the student should be able to:

- Describe the purpose of trash racks, bar screens, comminutors and grinders, and grit basins
- Compare and contrast different screen types
- Select a screen category given downstream equipment requirements
- Place a screen or grit basin into service or take one out of service
- Compare and contrast different types of grit basins
- Calculate flow velocity for an open channel or full pipe
- Determine the optimum number of grit basins to place into service to maintain a desired flow velocity
- Troubleshoot common screening and grit removal process control and mechanical problems
- Describe potential effects of Septage receiving on facility operations

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quiz are based on the various equipment types, operations and maintenance utilized in Preliminary treatment. Topics include: Screens, Grinders, Grit Removal, Septage, and Troubleshooting.

Course Outline

Preliminary Treatment & Quiz

3.25 Hrs

Total Hours

3.25 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Primary Treatment

Learning Objectives

- This course covers Wastewater Primary Treatment. At the end of the course the student should be able to:
- Describe the purpose of primary clarification
- Categorize influent parameters according to whether they can be removed by primary clarification
- Label all components of circular and rectangular primary clarifiers and describe the function of each
- Inspect and maintain clarifier equipment
- Place a primary clarifier into service or remove one from service
- Calculate hydraulic detention time (HDT) and surface overflow rate (SOR)
- Determine the optimum number of clarifiers to place into service to maintain a desired SOR and HDT
- Estimate the quantity of sludge produced given primary influent and effluent total suspended solids (TSS) concentrations
- Calculate sludge pumping time required for a given sludge thickness and volume
- Collect process control samples, conduct settleable solids analysis, and evaluate results
- Anticipate seasonal changes and make appropriate process control changes
- Troubleshoot common mechanical and process control problems

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quiz are based on the equipment, operations and maintenance utilized in Primary treatment. Topics: Purpose, Theory, Design, Clarifiers, Valves, Process Control, Maintenance, Troubleshooting, Records, and Safety.

Course Outline

Primary Treatment & Quiz	4.75 Hrs
Total Hours	4.75 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Biological Treatment

Learning Objectives

This course covers Biological Treatment. At the end of the course the student should be able to:

- Predict the fate of different nitrogen and phosphorus species during biological and chemical treatment.
- Interpret chemical equations, predict the composition of ionic compounds, convert moles to milligrams per liter (mg/L), and calculate chemical dosages from balanced chemical equations.
- Explain the steps involved in nitrification, denitrification, and enhanced biological phosphorus removal (EBPR) and identify the microorganisms responsible for each transformation.
- List the stoichiometric requirements for and products of nitrification, denitrification, EBPR, and chemical phosphorus removal.
- Identify the most important process control parameters for nitrification, denitrification, chemical phosphorus removal, and EBPR.
- Describe the effects of environmental variables (pH, dissolved oxygen [DO], etc.) on each biological process.

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quiz are based on the biological treatment aspects related to Wastewater.

Topics Include:

Microbiology, Bacteria and Microbial Growth Rates

Course Outline

Introduction to Wastewater

3.0 Hrs

Total Hours

3.0 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series - Wastewater Activated Sludge Treatment

Learning Objectives

This course covers Activated Sludge Treatment. At the end of the course the student should be able to:

- Describe the components of an activated sludge process and the functions of each.
- Describe the relationship between activated sludge microbiology and sludge settleability.
- Explain the importance of balancing the growth of floc formers and filament formers.
- Identify microorganisms common to activated sludge processes including filamentous bacteria, protozoa, metazoa.
- List at least three groups of microorganisms present in activated sludge and describe the conditions that promote their growth.
- Evaluate information on types of microorganisms present to determine underlying operating conditions.
- Compare and contrast complete-mix, plug-flow, and batch operation.
- Inspect and maintain equipment associated with the activated sludge process.
- Select a target dissolved oxygen (DO) concentration to prevent filamentous bulking and/or maximize ammonia removal rates.
- Describe how hydraulic and solids loading parameters are calculated for secondary clarifiers and the relative importance of each.
- Explain how the maximum solids loading rate to a secondary clarifier depends on sludge settling characteristics.
- Collect process control samples, conduct testing, and evaluate results.
- Start up a new activated sludge process, place a basin into service, or take one out of service.
- Troubleshoot common activated sludge and secondary clarifier process control and mechanical problems.
- Discuss differences between different types of activated sludge processes (complete mix, step feed, oxidation ditch, pureox, etc.). Understand that they are all based on the same underlying biological principles.

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quiz are based on the equipment types, operations and maintenance utilized in Activated Sludge Treatment and Clarification. Topics: Purpose & Theory, Design & Expected Performance, Equipment, Activated Sludge Process Variables & Control, Secondary Clarifier Process Variables & Control, Operation & Data Collection, Sample Analysis, Maintenance & Troubleshooting.

Course Outline

Activated Sludge	5.0 Hrs
Secondary Clarification	3.0 Hrs
Total Mins/Hours	8.5 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Fixed Film Treatment

Learning Objectives

This course covers Wastewater Fixed Film Treatment. At the end of the course the student should be able to:

- Understand biofilm growth and decay.
- Explain the principles underlying mass transport through a biofilm.
- Label all components of trickling filters and describe the function of each.
- Determine the direction of airflow through a trickling filter.
- Place a trickling filter into service or remove one from service.
- Inspect and maintain trickling filter.
- Calculate organic and hydraulic loading rates (HLRs) for trickling filters.
- Make process adjustments to maintain a desired biofilm thickness or weight in trickling filters.
- Determine the recycle ratio required to maintain a desired Spülkraft (SK) value for a trickling filter.
- Collect process control samples and evaluate results.
- Implement corrective actions to minimize the effects of biofilm predators.
- Troubleshoot common mechanical and process control problems.
- Label all RBCs and describe the function of each.
- Place an RBC into service or remove one from service.
- Inspect and maintain RBC equipment.
- Calculate organic and hydraulic loading rates (HLRs) RBCs.
- Make process adjustments to maintain a desired biofilm thickness or weight in RBCs.
- Interpret influent biochemical oxygen demand (BOD) data and adjust the size of stage 1 treatment for an RBC in response.
- Collect process control samples and evaluate results.
- Implement corrective actions to minimize the effects of biofilm predators.
- Troubleshoot common mechanical and process control problems.

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quizzes are based on the equipment types, operations and maintenance utilized in Fixed Film Treatment. Topics: Purpose & Theory, Design & Expected Performance, Equipment, Process Variables & Control, Operation & Data Collection, Sample Analysis, Maintenance & Troubleshooting.

Course Outline

Trickling Filters	4.50 Hrs
Rotating Biological Contactors	3.25 Hrs
Total Hours	7.75 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series - Wastewater Treatment Ponds

Learning Objectives

This course Wastewater Treatment Ponds. At the end of the course the student should be able to:

- List and describe the three types of wastewater ponds.
- Describe the interrelationships between bacteria, algae, and predator organisms.
- Explain the three mechanisms for nitrogen removal in ponds.
- Evaluate the effects of water temperature, sunlight, nutrient availability, and other operational parameters on population dynamics.
- Discuss the causes of fall and spring turnover in facultative ponds.
- Inspect and maintain pond components.
- Determine when to use series versus parallel operation.
- Calculate hydraulic detention time and organic loading rate.
- Place a pond into service or remove a pond from service.
- Collect process control samples and evaluate results.
- Troubleshoot common process control problems.

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quiz are based on the equipment types, operations and maintenance utilized in Treatment Ponds. Topics: Purpose & Theory, Design & Expected Performance, Equipment, Process Variables & Control, Operation & Data Collection, Sample Analysis, Maintenance & Troubleshooting.

Course Outline

Treatment Ponds & Quiz

4.25 Hrs

Total Hours

4.25 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Nutrient Removal

Learning Objectives

This course covers Wastewater Nutrient Removal. At the end of the course the student should be able to:

- Predict the fate of different nitrogen and phosphorus species during biological and chemical treatment.
- Interpret chemical equations, predict the composition of ionic compounds, convert moles to milligrams per liter (mg/L), and calculate chemical dosages from balanced chemical equations.
- Explain the steps involved in nitrification, denitrification, and enhanced biological phosphorus removal (EBPR) and identify the microorganisms responsible for each transformation.
- List the stoichiometric requirements for and products of nitrification, denitrification, EBPR, and chemical phosphorus removal.
- Identify the most important process control parameters for nitrification, denitrification, chemical phosphorus removal, and EBPR.
- Describe the effects of environmental variables (pH, dissolved oxygen [DO], etc.) on each biological process.
- Predict the fate of different nitrogen and phosphorus species during biological and chemical treatment.
- Interpret chemical equations, predict the composition of ionic compounds, convert moles to milligrams per liter (mg/L), and calculate chemical dosages from balanced chemical equations.
- Explain the steps involved in nitrification, denitrification, and enhanced biological phosphorus removal (EBPR) and identify the microorganisms responsible for each transformation.
- List the stoichiometric requirements for and products of nitrification, denitrification, EBPR, and chemical phosphorus removal.
- Identify the most important process control parameters for nitrification, denitrification, chemical phosphorus removal, and EBPR.
- Describe the effects of environmental variables (pH, dissolved oxygen [DO], etc.) on each biological process.

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quiz are based on the Nutrient Removal Process. Topics Include: Methodologies, Sampling and Analysis, Nitrogen, Phosphorus, Chemistry, Nitrification and De-nitrification

Course Outline

Nutrient Removal & Quiz

5.0 Hrs

Total Hours

5.0 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Wastewater Disinfection

Learning Objectives

This course covers Wastewater Disinfection. At the end of the course the student should be able to:

- Compare/contrast the goal of disinfection versus sterilization.
- Explain the concept of indicator organisms and list six characteristics that make an ideal indicator organism.
- Compare/contrast testing methods for indicator organisms.
- Discuss the effect of temperature and pH on chlorine chemistry.
- Predict the effect of various chemical components, for example, nitrite and ammonia, on chlorine residual.
- Understand the difference between combined, free, and total chlorine residual (TCR).
- Explain why understanding the breakpoint curve is important for facilities that nitrify.
- Manipulate contact time (CT) or residual to achieve a desired level of inactivation of indicator organisms.
- Adjust chlorine dose to meet discharge permit limits for indicator organisms.
- Label all components of different disinfection equipment and describe the various functions.
- Inspect, operate, and maintain chlorination, dechlorination, and UV disinfection equipment.
- Place disinfection equipment into service and remove it from service safely.
- Calculate chemical feed rate, dose, or flow given two of the three variables.
- Determine required chemical feed pump settings.
- Discuss UV inactivation of genetic material.
- Explain how effluent quality can affect UV disinfection efficiency.
- Troubleshoot common mechanical and process control problems.

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quizzes are based on the equipment types, operations and maintenance utilized in Disinfection. Topics: Purpose & Function, Theory of Operation, Design & Expected Performance, Equipment, Process Variables & Control, Operation & Data Collection, Sample Analysis, Maintenance & Troubleshooting.

Course Outline

Chlorine Disinfection	4.25 Hrs
UV Disinfection	3.25 Hrs
Total Hours	7.50 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.

Veolia Wastewater Operator Training Series – Basic Solids Processes

Learning Objectives

This course covers a general overview of Wastewater Solids Processes, in preparation for the Solids Process Series that is currently in development. At the end of the course the student should be able to:

- Describe and identify the various steps and processes involved in wastewater solids treatment
- Describe and identify the various steps and processes involved in wastewater Sludge Thickening
- Describe and identify the various steps and processes involved in wastewater Aerobic Digestion
- Describe and identify the various steps and processes involved in wastewater Anaerobic Digestion
- Describe and identify the various steps and processes involved in wastewater Solids Management
- Solve various math problems associated with the solids processes

Training Methods

The training course was developed using the iSpring development software and LMS system to provide the learner an interactive online learning environment with presentation, video, example scenarios and a quiz. Enrolled students have access to the entire Wastewater Training Series.

Course Content

The objectives and quiz are based on Wastewater Solids Processes. Topics Include: Solids Overview, Sludge Thickening, Digestion, Biosolids and Math

Course Outline

Solids Processes & Quiz

2.25 Hrs

Total Hours

2.25 Hrs

Student Assessment

The quizzes verify comprehension of the material presented. The questions are various formats of true/false, multiple choice, and matching. The student must answer every question and pass with a minimum score of 70% to continue to the next course in the series.

Instructor Bio:

Kimberly Reeder, is a certified water and wastewater operator having served the military and municipal communities for many years.