

10045 - Activated Sludge - process and overview series

Activated Sludge –Process and Overview Series is a five-hour series including the five individual courses, Activated Sludge I to V. From the beginnings of the authentic activated sludge process in Holland, through its development over the past forty years in the extended aeration mode, to the various current configurations and methods, and finally reviewing a few troubleshooting cases to sharpen your insight into process control, here's a breakdown for you:

- Activated Sludge I is the first in a series of five courses that describe and discuss, in-depth, the activated sludge process. This introduction and overview present the early history of the activated sludge process while breaking down the various procedures or methods used in wastewater treatment.
- Activated Sludge II includes a discussion of new microbes that have been identified. The quantity generated can vary with the different activated sludge processes. The bacterial growth curve and its relationship to SRT, F/M, and oxygen requirements will be explained.
- Activated Sludge III will discuss the various aspects of oxygen transfer, oxygen demand, and oxygen uptake. It incorporates a discussion of aeration system oxygen transfer efficiency, and the effect of industrial waste and in-plant recycle streams on air requirements.
- Activated Sludge IV explains 'why?' No examination of the activated sludge treatment process would be complete without a discussion of process control and troubleshooting. Until the early 1970's, these topics received little attention. Operators were left to their own analysis and skills to cope with treatment problems. Traditional tests, such as BOD, suspended solids, or sludge volume index (SVI) using a 1000 ml graduated cylinder were, at best, marginally helpful. Most of the operational books at that time had very little information that dealt with process problems.
- Activated Sludge V is the final segment of the course series, where we discuss process control testing, looking at additional on-site testing options that can enhance the operator's awareness of the health of the biological system. There will be an emphasis on troubleshooting. Microscopic examination and oxygen uptake rate are also very useful process control monitoring tools that should be a part of every process control laboratory.

During the production cycle of 2024, our tech team utilized AI tools and apps to convert and develop an update to some Classic courses involved in the "hands-on" and "Need-to-Do" requirements of the day. This content has been re-created with the latest in voice generation and streaming illustrations. As a bonus, these online, continuing education courses are available for unlimited re-play during your studies. Whether to clarify a concept or to go further into details presented, you are free to re-play any segment of these trainings as often as you need.

10045 - Activated Sludge - process and overview series
Activated Sludge - I -- process and overview series
Activated Sludge - II -- process and overview series
Activated Sludge - III -- process and overview series
Activated Sludge - IV -- process and overview series
Activated Sludge - V -- process and overview series

Course Series Package includes current and emerging topics in a themed environment of self-paced studies, instructionally designed to reinforce basic and commonsense techniques for day-to-day operational activities, and to encourage the "Need-to-Do" attitude instead of the "wait and see" in preventive maintenance. Some in these series are summaries of overall technical topics covered in greater detail.

Author Full Name: Bill Edgar

Experience: Bill has over forty-five (45) years of experience in water, wastewater, and environmental projects throughout the State of Florida. He is responsible for numerous applications and installations, including several facilities that have received local and/or national recognition. He worked with *Professional Testing of Tallahassee* in the development of certification exams for the Florida Construction Licensing Board for the positions of Certified General Contractor and Certified Mechanical Contractor. In addition, Edgar is involved with the State of Florida, Department of Environmental Protection Operator Certification Program in the review and development of certification exams for all licensed wastewater treatment plant operators.

Course Title: Activated Sludge - I

ANSI/IACET CEU Calculations - Required to complete this Course: 1-hour course

Course Summary:

Activated Sludge I is the beginning in a series of five courses that describe and discuss in-depth the activated sludge process. This introduction and overview describe the early history of the activated sludge process, along with breaking down the various types or methods used in wastewater treatment. Some of the procedures were taken from case studies of the 1970's and early 1980's, where initial troubleshooting of the activated sludge process began. The Carbon Cycle illustrated the basics and interfaces with the Oxygen Cycle.

The development of the activated sludge technology breaks down the methods of the process. Some of the typical operational aspects are discussed with reference to mean cell residence time or solids retention time, and its relationship with the F/M ratio. And in the final section of this course, we will highlight some of the treatment plant microbiology looking at sick microbe population and bacteria growth. The Activated Sludge process and overview series is comprised of five individual course to provide a five-hour discussion in your continuing education requirements and a "skill set" review for you.

Learning Outcomes: By the end of this training course, you will have the ability to:

- Better understanding and indication of the sludge age by bacteria population
- Define sludge age
- Describe the aeration process and activated sludge
- Explain the wastewater treatment process
- Identify the flow design and adjust the process for various flow patterns
- Analyze the bacterial growth and adjust for its' food ratio

Course Breakdown: The following breakdown describes the individual sections:

- Section 1 – Introduction and Overview
- Section 2 – The Development of Activated Sludge Technology
- Section 3 – Treatment Plant Microbiology

CEU			CEU
ID #	Course Title	Instructor	Hours
351	Activated Sludge I – process and overview series	Edgar	one



Content & Instructional Course Design Worksheet

Activation - 10.24.2024

CEU Plan # 351 – Activated Sludge I – process and overview series

Instructor: Bill Edgar

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Course hours: one

Unit/Lesson Name	Time Allotted	Content Description and/or Purpose	List Learning Outcomes	Method Used (Demonstrate Accommodation of Different Learning Styles)	Assessment Method	Instructional Materials Used	Comments/ Notes
Section 1	content: 13.29 Minutes quiz: 10 minutes Cumulative: 23 minute	Introduction and Overview	<ul style="list-style-type: none"> Describe the aeration process and activated sludge Explain the wastewater treatment process Define sludge age 	Streaming Based Online monitor of student's progress measured in elapsed time (in minutes) Video Clip illustrating content within this section	Computer Based Exam Contact time is measured to IACET standards and State requirement	Required view of streaming clip, via streaming – take quiz upon completion of course material section View Table, Charts, and Photographic Images	Inform students of the required text reading in their course enrollment confirmation – Auto response At the conclusion of the course section, instructions to proceed to the quiz will be indicated.

Section 2	content: 15.06 Minutes quiz: 10 minutes Cumulative: 25 minute	The Development of Activated Sludge Technology	<ul style="list-style-type: none"> • Better understanding and indication of the sludge age by bacteria population • Define sludge age • Calculate the sludge age. 	Streaming Based Online monitor of student's progress measured in elapsed time Video Clip illustrating content within this section	Computer Based Exam	Required view of streaming clip, via streaming – take quiz upon completion of course material section View Table, Charts, and Photographic Images	Inform students of the required text reading in their course enrollment confirmation – Auto response At the conclusion of the course section, instructions to proceed to the quiz will be indicated.
Section 3	content: 10.34 Minutes quiz: 10 minutes Cumulative: 20 minute	Treatment Plant Microbiology	<ul style="list-style-type: none"> • Identify the flow design and adjust the process for various flow patterns. • Analyze the bacterial growth and adjust for its' food ratio 	Streaming Based Online monitor of student's progress measured in elapsed time (in minutes) Video Clip illustrating content within this section	Computer Base - Final Exam Essay Question - listing objectives learned from the course and how they apply one's job and workplace Final Course Essay and Evaluation form	Required view of streaming clip, listen to audio presentation via streaming – take final quiz upon completion of course material section Instructions to complete studies and evaluation form	Inform students of the required assignments in the top header of the content section. Complete the essay and evaluation form, prior to course being complete.

Cumulative Time:

sec 1 =	23									
sec 2 =	25									
sec 3 =	20									

Cumulative time total : 68 minutes = 1 hours = 0.1 CEU

updated to streaming 10.22.2024

**** Standard beta allows one minute for each question and answer. The essay requirement listing three things that student has learned from the course with a 10-15 word description of each is a non-measured time element of the course; it was not included the 2017 beta testing.**



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Assessment Analysis- Level 3 - CEU Plan Beta Testing was performed during January, 2025. At the beginning of 2025, student feedback and comments were collected in the final beta testing results, along with cumulative average of student tracking and monitoring posted during the July - October, 2025 test period. The Level 1 and Level 2 Beta Testing has been completed and comply with the ANSI I IACET 1-2023 Standard, along with the internal review by CEU Plan.

Author Full Name: Bill Edgar

Experience: Bill has over forty-five (45) years of experience in water, wastewater, and environmental projects throughout the State of Florida. He is responsible for numerous applications and installations, including several facilities that have received local and/or national recognition. He worked with *Professional Testing of Tallahassee* in the development of certification exams for the Florida Construction Licensing Board for the positions of Certified General Contractor and Certified Mechanical Contractor. In addition, Edgar is involved with the State of Florida, Department of Environmental Protection Operator Certification Program in the review and development of certification exams for all licensed wastewater treatment plant operators.

Course Title: Activated Sludge - II

ANSI/IACET CEU Calculations - Required to complete this Course: 1-hour course

Course Summary:

Activated Sludge II includes a discussion of new microbes, that have been produced, and the amount generated can vary with the different activated sludge processes. The bacterial growth curve and its relationship to SRT, F/M, and oxygen requirements will be explained.

The secondary clarifier is a critical component of the overall treatment process. Several types of clarifiers in common use will be described, along with explaining the wasting of sludge or its' return to the process train. Quickly returning settled microbes to the aerator, and the rate of return, are critical to the performance of both the aerator and final clarifier. How an appropriate return sludge rate is determined and maintained will be explained. This course, Activated Sludge II, is part of The Activated Sludge process and overview series is comprised of five individual course to provide a five-hour discussion in your continuing education requirements and a "skill set" review for you.

Learning Outcomes: By the end of this training course, you will have the ability to:

- Identify the rate of return sludge and adjust as process requires
- Understanding the role of the secondary clarifier
- Identify the sludge blanket level to calculate the RAS-WAS rates
- Explain the rate of return and waste sludge for process control
- Evaluate the waste sludge rate and reduce as process requires
- Identify the rate of waste sludge and adjust as process requires

Course Breakdown: The following breakdown describes the individual sections:

- Section 1 – Waste Activated Sludge
- Section 2 – Secondary Clarifiers
- Section 3 – Return Sludge

CEU			CEU
ID #	Course Title	Instructor	Hours
352	Activated Sludge II – process and overview series	Edgar	one



Content & Instructional Course Design Worksheet

Activation - 11.15.2024

CEU Plan # 352 – Activated Sludge II – process and overview series

Instructor: Bill Edgar

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Course hours: **one**

Unit/Lesson Name	Time Allotted	Content Description and/or Purpose	List Learning Outcomes	Method Used (Demonstrate Accommodation of Different Learning Styles)	Assessment Method	Instructional Materials Used	Comments/ Notes
Section 1	<p>content: 12.19 Minutes</p> <p>quiz: 10 minutes</p> <p>Cumulative: 22 minute</p>	Waste Activated Sludge	<ul style="list-style-type: none"> Identify the rate of waste sludge and adjust as process requires Evaluate the waste sludge rate and reduce as process requires 	<p>Streaming Based</p> <p>Online monitor of student's progress measured in elapsed time (in minutes)</p> <p>Video Clip illustrating content within this section</p>	<p>Computer Based Exam</p> <p>Contact time is measured to IACET standards and State requirement</p>	<p>Required view of streaming clip, via streaming – take quiz upon completion of course material section</p> <p>View Table, Charts, and Photographic Images</p>	<p>Inform students of the required text reading in their course enrollment confirmation – Auto response</p> <p>At the conclusion of the course section, instructions to proceed to the quiz will be indicated.</p>

Section 2	content: 8.53 Minutes quiz: 10 minutes Cumulative: 19 minute	Secondary Clarifiers	<ul style="list-style-type: none"> Understanding the role of the secondary clarifier Identify the rate of return sludge and adjust as process requires 	Streaming Based Online monitor of student's progress measured in elapsed time Video Clip illustrating content within this section	Computer Based Exam	Required view of streaming clip, via streaming – take quiz upon completion of course material section View Table, Charts, and Photographic Images	Inform students of the required text reading in their course enrollment confirmation – Auto response At the conclusion of the course section, instructions to proceed to the quiz will be indicated.
Section 3	content: 14.49 Minutes quiz: 10 minutes Cumulative: 25 minute	Return Sludge	<ul style="list-style-type: none"> Identify the sludge blanket level to calculate the RAS-WAS rates Explain the rate of return and waste sludge for process control 	Streaming Based Online monitor of student's progress measured in elapsed time (in minutes) Video Clip illustrating content within this section	Computer Base - Final Exam Essay Question - listing objectives learned from the course and how they apply one's job and workplace Final Course Essay and Evaluation form	Required view of streaming clip, listen to audio presentation via streaming – take final quiz upon completion of course material section Instructions to complete studies and evaluation form	Inform students of the required assignments in the top header of the content section. Complete the essay and evaluation form, prior to course being complete.

Cumulative Time:

sec 1 =	22									
sec 2 =	19									
sec 3 =	25									

Cumulative time total : 66 minutes = 1 hours = 0.1 CEU

updated to streaming 11.02.2024

**** Standard beta allows one minute for each question and answer. The essay requirement listing three things that student has learned from the course with a 10-15 word description of each is a non-measured time element of the course; it was not included the 2017 beta testing.**



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Author Full Name: Bill Edgar

Experience: Bill has over forty-five (45) years of experience in water, wastewater, and environmental projects throughout the State of Florida. He is responsible for numerous applications and installations, including several facilities that have received local and/or national recognition. He worked with *Professional Testing of Tallahassee* in the development of certification exams for the Florida Construction Licensing Board for the positions of Certified General Contractor and Certified Mechanical Contractor. In addition, Edgar is involved with the State of Florida, Department of Environmental Protection Operator Certification Program in the review and development of certification exams for all licensed wastewater treatment plant operators.

Course Title: Activated Sludge - III

ANSI/IACET CEU Calculations - Required to complete this Course: 1-hour course

Course Summary: This course will discuss the various aspects of oxygen transfer, oxygen demand, and oxygen uptake. It incorporates a discussion of aeration system oxygen transfer efficiency, and the effect of industrial wastes and in-plant recycle streams on air requirements. Section one includes a procedure for testing oxygen transfer, along with illustrating the various types of aeration systems and their standard or effective rate.

In Section Two, we will discuss the effect of temperature, sludge retention time (SRT), and nitrification on air requirements. Discussion of the nitrification process as it relates to oxygen demand and a brief history of nitrification are provided. And in the final section, we cover oxygen demand testing – Biochemical Oxygen Demand (BOD) and Oxygen Uptake Rate (OUR). For decades the BOD test has been the basis for this country's water pollution control laws and engineering treatment standards. It is also the test required by regulatory agencies to determine organic removal treatment efficiency. This section will provide you with the testing procedure for oxygen uptake rate, what's required, how to determine OUR, and lastly, how to evaluate the results from an operator's perspective.

Learning Outcomes: By the end of this training course, you will have the ability to:

- Identify the transfer rates and how to control the sludge levels
- Evaluate the oxygen demand and DO requirements
- Identify the transfer rates and how to control the sludge levels
- Explain the sludge blanket
- Calculate the sludge age
- Describe the endogenous respiration stage
- Highlight the early process problems with suggestions for today
- Explain the use of an air lift pump on small systems

Course Breakdown: The following breakdown describes the individual sections:

- Section 1 – Oxygen Utilization by the Biological System
- Section 2 – Liquid Temperature - Nitrification
- Section 3 – Measuring Oxygen Demand

CEU			CEU
ID #	Course Title	Instructor	Hours
353	Activated Sludge III – process and overview series	Edgar	one



Content & Instructional Course Design Worksheet

Activation - 11.15.2024

CEU Plan # 353 – Activated Sludge III – process and overview series

Instructor: Bill Edgar

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Course hours: **one**

Unit/Lesson Name	Time Allotted	Content Description and/or Purpose	List Learning Outcomes	Method Used (Demonstrate Accommodation of Different Learning Styles)	Assessment Method	Instructional Materials Used	Comments/ Notes
Section 1	content: 14.23 Minutes quiz: 10 minutes Cumulative: 25 minute	Oxygen Utilization by the Biological System	<ul style="list-style-type: none"> • Understand the DO levels and how they apply to process control • Evaluate the oxygen demand and DO requirements • Describe the endogenous respiration stage • Highlight the early process problems with suggestions for today 	Streaming Based Online monitor of student's progress measured in elapsed time (in minutes) Video Clip illustrating content within this section	Computer Based Exam Contact time is measured to IACET standards and State requirement	Required view of streaming clip, via streaming – take quiz upon completion of course material section View Table, Charts, and Photographic Images	Inform students of the required text reading in their course enrollment confirmation – Auto response At the conclusion of the course section, instructions to proceed to the quiz will be indicated.

Section 2	content: 13.00 Minutes quiz: 10 minutes Cumulative: 23 minute	Liquid Temperature - Nitrification	<ul style="list-style-type: none"> Evaluate the oxygen demand and DO requirements. Understand the DO levels and how they apply to process control explain the use of an air lift pump on small systems 	Streaming Based Online monitor of student's progress measured in elapsed time Video Clip illustrating content within this section	Computer Based Exam	Required view of streaming clip, via streaming – take quiz upon completion of course material section View Table, Charts, and Photographic Images	Inform students of the required text reading in their course enrollment confirmation – Auto response At the conclusion of the course section, instructions to proceed to the quiz will be indicated.
Section 3	content: 11.26 Minutes quiz: 10 minutes Cumulative: 22 minute	Measuring Oxygen Demand	<ul style="list-style-type: none"> Identify the transfer rates and how to control the sludge levels Calculate the sludge age explain the sludge blanket 	Streaming Based Online monitor of student's progress measured in elapsed time (in minutes) Video Clip illustrating content within this section	Computer Base - Final Exam Essay Question - listing objectives learned from the course and how they apply one's job and workplace Final Course Essay and Evaluation form	Required view of streaming clip, listen to audio presentation via streaming – take final quiz upon completion of course material section Instructions to complete studies and evaluation form	Inform students of the required assignments in the top header of the content section. Complete the essay and evaluation form, prior to course being complete.

Cumulative Time:

sec 1 =	25									
sec 2 =	23									
sec 3 =	22									

Cumulative time total : 70 minutes = 1 hours = 0.1 CEU

updated to streaming 11.02.2024

**** Standard beta allows one minute for each question and answer. The essay requirement listing three things that student has learned from the course with a 10-15 word description of each is a non-measured time element of the course; it was not included the 2017 beta testing.**



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Author Full Name: Bill Edgar

Experience: Bill has over forty-five (45) years of experience in water, wastewater, and environmental projects throughout the State of Florida. He is responsible for numerous applications and installations, including several facilities that have received local and/or national recognition. He worked with *Professional Testing of Tallahassee* in the development of certification exams for the Florida Construction Licensing Board for the positions of Certified General Contractor and Certified Mechanical Contractor. In addition, Edgar is involved with the State of Florida, Department of Environmental Protection Operator Certification Program in the review and development of certification exams for all licensed wastewater treatment plant operators.

Course Title: Activated Sludge - IV

ANSI/IACET CEU Calculations - Required to complete this Course: 1-hour course

Course Summary:

No examination of the activated sludge treatment process would be complete without a discussion of process control and troubleshooting. Until the early 1970's, these topics received little attention. Operators were left to their own means to cope with treatment problems. Traditional tests such as BOD, suspended solids, sludge volume index (SVI) using a 1000 ml graduated cylinder were, at best, marginally helpful. Most of the operational books at that time had very little information that dealt with process problems. Today, there is a wealth of information available that discusses process control and troubleshooting. This course consolidates much of what has been learned about these subjects over the past 30 years. It also includes information and learning experiences that the author has been made aware of during his 42-year career as both an operator and instructor.

The basis of the Clean Water Act is given with some of the clean-ups and procedures developed during the initial operating days. An ongoing discussion of troubleshooting and process control development of the activated sludge technology is explored.

Learning Outcomes: By the end of this training course, you will have the ability to:

- Describe return flow control
- Explain how a high BOD can be caused by Nitrification
- Increase of nitrites and not nitrates will result in higher chlorine demand
- Demonstrate the use of a Centrifuge as a quick look at your solids inventory
- Discuss how Nitrites can interfere with Chlorine Residuals

Course Breakdown: The following breakdown describes the individual sections:

- Section 1 – Three Unique Operational Problems
- Section 2 – Activated Sludge Process - Observations
- Section 3 – Process Control Testing

CEU			CEU
ID #	Course Title	Instructor	Hours
354	Activated Sludge IV – process and overview series	Edgar	one



Content & Instructional Course Design Worksheet

Activation - 11.15.2024

CEU Plan # 354 – Activated Sludge IV – process and overview series

Instructor: Bill Edgar

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Course hours: **one**

Unit/Lesson Name	Time Allotted	Content Description and/or Purpose	List Learning Outcomes	Method Used (Demonstrate Accommodation of Different Learning Styles)	Assessment Method	Instructional Materials Used	Comments/ Notes
Section 1	content: 16.39 Minutes quiz: 10 minutes Cumulative: 27 minute	Three Unique Operational Problems	<ul style="list-style-type: none"> List the types of foam Increase of nitrites and not nitrates will result in higher chlorine demand 	Streaming Based Online monitor of student's progress measured in elapsed time (in minutes) Video Clip illustrating content within this section	Computer Based Exam Contact time is measured to IACET standards and State requirement	Required view of streaming clip, via streaming – take quiz upon completion of course material section View Table, Charts, and Photographic Images	Inform students of the required text reading in their course enrollment confirmation – Auto response At the conclusion of the course section, instructions to proceed to the quiz will be indicated.

Section 2	content: 16.11 Minutes quiz: 10 minutes Cumulative: 26 minute	Activated Sludge Process - Observations	<ul style="list-style-type: none"> Discuss how Nitrites can interfere with Chlorine Residuals Demonstrate the use of a Centrifuge as a quick look at your solids inventory 	Streaming Based Online monitor of student's progress measured in elapsed time Video Clip illustrating content within this section	Computer Based Exam	Required view of streaming clip, via streaming – take quiz upon completion of course material section View Table, Charts, and Photographic Images	Inform students of the required text reading in their course enrollment confirmation – Auto response At the conclusion of the course section, instructions to proceed to the quiz will be indicated.
Section 3	content: 16.30 Minutes quiz: 10 minutes Cumulative: 27 minute	Process Control Testing	<ul style="list-style-type: none"> Explain how a high BOD can be caused by Nitrification Describe return flow control Indicate foam issues 	Streaming Based Online monitor of student's progress measured in elapsed time (in minutes) Video Clip illustrating content within this section	Computer Base - Final Exam Essay Question - listing objectives learned from the course and how they apply one's job and workplace Final Course Essay and Evaluation form	Required view of streaming clip, listen to audio presentation via streaming – take final quiz upon completion of course material section Instructions to complete studies and evaluation form	Inform students of the required assignments in the top header of the content section. Complete the essay and evaluation form, prior to course being complete.

Cumulative Time:

sec 1 =	27									
sec 2 =	26									
sec 3 =	27									

Cumulative time total : 80 minutes = 1 hours = 0.1 CEU

updated to streaming 11.02.2024

**** Standard beta allows one minute for each question and answer. The essay requirement listing three things that student has learned from the course with a 10-15 word description of each is a non-measured time element of the course; it was not included the 2017 beta testing.**



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Course Title: Activated Sludge - V

ANSI/IACET CEU Calculations - Required to complete this Course: 1-hour course

Course Summary:

In this final segment of the course series, we will complete our discussion of process control testing, looking at additional on-site testing options that can enhance the operator's awareness of the health of the biological system. There will be an emphasis on troubleshooting. Microscopic examination and oxygen uptake rate are also very useful process control monitoring tools that should be a part of every process control laboratory. These tests and interpretation of results are described.

An extended discussion of foaming. Nocardia: What is it? How do you get rid of it? Sludge bulking can be a very serious operational problem. A discussion of causes and solutions sheds light on this complex subject. A discussion of the effect of temperature on the biological process.

Learning Outcomes: By the end of this training course, you will have the ability to:

- Measure adequate oxygen in the aeration tank use a pH meter with a millivolt scale
- Explain how grease and oil, plus warm temperature are associated with Nocardia
- Describe what causes and how to prevent and control Nocardia.
- Establish an Oxygen Uptake Rate test
- Review of RAS - WAS rates
- Evaluating mixed liquor regularly will allow you to catch a problem before it turns into a disaster

Course Breakdown: The following breakdown describes the individual sections:

- Section 1 – Process Control Testing
- Section 2 – Troubleshooting Foaming, Bulking, & Temperature
- Section 3 – Process Calculations & Troubleshooting

CEU			CEU
ID #	Course Title	Instructor	Hours
355	Activated Sludge V – process and overview series	Edgar	one



Content & Instructional Course Design Worksheet

Activation - 11.22.2024

CEU Plan # 355 – Activated Sludge V – process and overview series

Instructor: Bill Edgar

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Course hours: **one**

Unit/Lesson Name	Time Allotted	Content Description and/or Purpose	List Learning Outcomes	Method Used (Demonstrate Accommodation of Different Learning Styles)	Assessment Method	Instructional Materials Used	Comments/ Notes
Section 1	<p>content: 17.06 Minutes</p> <p>quiz: 11 minutes</p> <p>Cumulative: 28 minute</p>	Process Control Testing (continued)	<ul style="list-style-type: none"> • Explain how grease and oil, plus warm temperature are associated with Nocardia • Measure adequate oxygen in the aeration tank use a ph meter with a millivolt scale 	<p>Streaming Based</p> <p>Online monitor of student's progress measured in elapsed time (in minutes)</p> <p>Video Clip illustrating content within this section</p>	<p>Computer Based Exam</p> <p>Contact time is measured to IACET standards and State requirement</p>	<p>Required view of streaming clip, via streaming – take quiz upon completion of course material section</p> <p>View Table, Charts, and Photographic Images</p>	<p>Inform students of the required text reading in their course enrollment confirmation – Auto response</p> <p>At the conclusion of the course section, instructions to proceed to the quiz will be indicated.</p>

Section 2	content: 16.36 Minutes quiz: 11 minutes Cumulative: 28 minute	Troubleshooting Foaming, Bulking, & Temperature	<ul style="list-style-type: none"> Establish an Oxygen Uptake Rate test Describe what causes and how to prevent and control Nocardia. 	Streaming Based Online monitor of student's progress measured in elapsed time Video Clip illustrating content within this section	Computer Based Exam	Required view of streaming clip, via streaming – take quiz upon completion of course material section View Table, Charts, and Photographic Images	Inform students of the required text reading in their course enrollment confirmation – Auto response At the conclusion of the course section, instructions to proceed to the quiz will be indicated.
Section 3	content: 16.31 Minutes quiz: 10 minutes Cumulative: 26 minute	Process Calculations & Troubleshooting	<ul style="list-style-type: none"> Evaluating mixed liquor regularly will allow you to catch a problem before it turns into a disaster Review of RAS - WAS rates 	Streaming Based Online monitor of student's progress measured in elapsed time (in minutes) Video Clip illustrating content within this section	Computer Base - Final Exam Essay Question - listing objectives learned from the course and how they apply one's job and workplace Final Course Essay and Evaluation form	Required view of streaming clip, listen to audio presentation via streaming – take final quiz upon completion of course material section Instructions to complete studies and evaluation form	Inform students of the required assignments in the top header of the content section. Complete the essay and evaluation form, prior to course being complete.

Cumulative Time:

sec 1 =	28								
sec 2 =	28								
sec 3 =	26								

Cumulative time total : 82 minutes = 1 hours = 0.1 CEU

updated to streaming 11.02.2024

**** Standard beta allows one minute for each question and answer. The essay requirement listing three things that student has learned from the course with a 10-15 word description of each is a non-measured time element of the course; it was not included the 2017 beta testing.**



In 2017, the original text base version was tested in compliance with IACET Standards. This text base version has been updated in 2024 and AI tools were utilized in the course update and content development. [Copyright © 2001-2024 CEU Plan, Incorporated. All rights reserved](#)

Assessment Analysis- Level 3 - CEU Plan Beta Testing was performed during January, 2025. At the beginning of 2025, student feedback and comments were collected in the final beta testing results, along with cumulative average of student tracking and monitoring posted during the July - October, 2025 test period. The Level 1 and Level 2 Beta Testing has been completed and comply with the ANSI I IACET 1-2023 Standard, along with the internal review by CEU Plan.