

Office of Water Programs Online Course Time Assignment

This course time assignment outlines the components of an online distance learning training course offered by OWP for continuing education units (CEUs) or contact hours.

Title of course: Activated Sludge (WAT601B)

Related training material title: "Operation of Wastewater Treatment Plants," Volume 1, Eighth Edition

CEUs/Contact hours: 4.0 CEUs/40 contact hours

Course Outline: Activated Sludge (Based on Chapter 5 OWTP1 8thED)

Secondary treatment basics	Laboratory testing
NPDES treatment standards	Record keeping
Secondary treatment processes	Primary control points
Aeration tanks	Maintaining microorganism populations
Secondary clarifiers	Controlling dissolved oxygen
Activated sludge process control	Managing solids separation in secondary clarifiers
Collection system variables	Normal operation
Influent and mixed liquor characteristics	Operational strategy and routine operator tasks
Load, inventory, and volumetric organic loading calculations	Process performance monitoring
Food-to-microorganism ratio (F/M)	Process data analysis and review
Operating parameters	Controlling the process and operator response
Activated sludge and flow balance	Microbiology for activated sludge
Solids balance	Microorganisms in activated sludge
RAS flow and concentration relationship	Sample collection and preparation
Solids retention time (SRT) and WAS/SRT interaction	Bacteria, protozoa, rotifers, viruses, fungi, and algae
Surface overflow rate (SOR)	Using microscopes
Solids loading rate (SLR)	Observations and frequency of examination
Sludge volume index (SVI)	Interpretation of results
Aeration system equipment and function	Desirable and undesirable microorganisms
Secondary clarifier equipment and function	Comparing results and tracking changes
Temperature effects	Response to results
Process monitoring, control, and data collection	Aeration system problems
Monitoring tools	Foaming (aeration tank foaming, stiff white foam, brown foam, dark/black foam)
Automated control systems	Problems in secondary clarifiers
Measurements, testing, and inspections	Sludge bulking, septic sludge, clumping/rising sludge, ashing, pinpoint floc, straggler floc, cloudy secondary effluent
Process inspection	Troubleshooting
Abnormal operation	Activated sludge process
Major causes of abnormal operation	Equipment operation under abnormal conditions
Hydraulics, water quality, equipment malfunction, plant changes, process control, environmental changes, design deficiency	Surface aerators
Typical operational problems and solutions	Blowers and air systems

Problems in aeration tanks	Biological balance
Toxicity to organisms	Air headers and diffusers
Safety in wastewater treatment operations	Gates and valves
Understanding hazards and general safety guidelines	Sludge collectors
Equipment-specific hazards	Flow control equipment
Pressurized systems, air distribution, and diffusers	Tank mixers
Surface aerators, blowers, and positive displacement pumps	Surface aerators
Chemical, biological, and atmospheric hazards	Diffused aeration systems
Confined space entry and ventilation	Blowers and air distribution systems
Fall and drowning prevention	Diffusers
Guardrails, teamwork, and proper lighting	Secondary clarifiers
Electrical safety and ignition source control	RAS/WAS pumps
Emergency protocols, equipment guards, and housekeeping	Instrumentation
Maintenance in wastewater treatment operations	

Average word count: 520 words per page

Average reading speed: 130 words per minute; 4 minutes per page

The course is based on Chapter 5, “Activated Sludge” of the related training manual. The course contains video, text, tables, graphs, illustrations, math example problems, and chapter review questions to enhance the presentation of information and the student learning experience. The course is designed for students to spend the same amount of time reading the text, tables, graphs, and illustrations as they spend reading the equivalent amount of related course material presented on screen.

Number of Web screens (internal): The course contains 120 web system screens.

Web screens consist of 109 content screens, 10 lesson quiz screens, and 1 final exam screen.

Average reading speed: 1 minute per screen

The web screens function as the “instructor” for the course, providing topic introduction, video clips, reading assignments, interactive student exercises, quizzes, and a final exam.

Number of Interactive exercises: The course contains a total of 60 interactive exercises.

Average interactive exercise answer speed: 3 minutes per interactive exercise

Number of math example exercises: The course contains 105 wastewater system math example exercises that support and expand the concepts presented in the online course text.

Average math example exercise answer speed: 3 minutes per math exercise

Number of review questions: The course contains 116 review questions in the “Check Your Understanding” section at the end of each topic in the reading assignments and 47 video lesson review questions dispersed throughout each video lesson. Question types are short answer and best answer.

Average chapter review question/answer speed: 2 minutes per question

Number of minutes of video: The course contains 160.56 minutes of video. Students are projected to watch two viewings.

Average video viewing time per minute of video: 2 minutes

Number of flashcards: The course contains 62 flashcards. Students are projected to view them once.

Average viewing time: 1 minute

Number of lesson quiz questions: The course contains 100 end of lesson quiz questions. Question types include best answer (one correct answer) and math (requiring students to work through equations to find solutions).

Average lesson quiz question / answer speed: 3 minutes

Final exam: The course contains 50 final exam questions. Question types include best answer (one correct answer) and math (requiring students to work through equations to find solutions).

Average final exam question/answer speed: 3 minutes per final exam question

The table summarizes the course components outlined above and shows the calculations for the total time assignment values in minutes and hours.

Course component	Number of component units	Minutes required to complete component units			Total time assignment for component
Text pages	160	x	4	=	640
Web screens	120	x	1	=	120
Interactive exercises	60	x	3	=	180
Math example exercises	105	x	3	=	315
Chapter review questions	116	x	2	=	232
Videos (minutes)	160.56	x	2	=	321.12
Final exam questions	50	x	3	=	150
Video review questions	47	x	2	=	94
Lesson quiz questions	100	x	3	=	300
Flashcard pages	62	x	1	=	62
					2,414 minutes
					40.2 hours
					4.0 CEUs