



# Online Learning Academy

## November 2023

### 2023 Design Course Overview

NOWRA has developed nine (9) **NEW** courses from recorded presentations of NOWRA experts given at education sessions at the 2022 and 2023 Water & Wastewater Equipment, Treatment & Transport (WWETT) Show. These courses cover a wide variety of topics and were selected due to their continued relevancy to the decentralized industry. This increases the number of Design Courses from 7 to 16.

The Design Course is a national training course with many different instructors that includes various formats including video guided PowerPoint presentations, videos, technical documents, and internet links to associated materials. The students set their own pace for training and take any, or all, of the new 9 courses (11.5 hours) based on how many hours they need or their interest. The hours assigned for each section are based on the time it took those who piloted the material to complete the course, and the theoretical time it should take to go through the materials. Even though everyone learns at a different pace, it should always take participants the amount of credit hours offered and may take longer.

The 2023 Design Course curriculum is made up of the following courses which are to be taken as individual courses.

1. Wastewater Characteristics (1 hr.): <https://www.pathlms.com/nowra/courses/47437#>
2. Time Dosing & Flow Equalization (1 hr.):  
<https://www.pathlms.com/nowra/courses/47443#>
3. Gravity Distribution (1 hr.): <https://www.pathlms.com/nowra/courses/47448#>
4. Collection Systems (2 hrs.): <https://www.pathlms.com/nowra/courses/47449#>
5. Drip Distribution (2 hrs.): <https://www.pathlms.com/nowra/courses/47450#>
6. Mound Systems (1 hr.): <https://www.pathlms.com/nowra/courses/57400#>
7. Pumps and Controls (1 hr.): <https://www.pathlms.com/nowra/courses/57411#>
8. Introduction to Nitrogen Removal (1 hr.):  
<https://www.pathlms.com/nowra/courses/57420#>
9. Benefits of Decentralized Wastewater Treatment (1.5 hrs.):  
<https://www.pathlms.com/nowra/courses/57449#>

## Course Agenda

The details of each course are outlined below.

### Course 1 – Wastewater Characteristics (1 hr.)

1. Reading – References and Presentation Slides
2. One Presentation (60 minutes)

#### **Wastewater Characteristics: Inorganic Solids**

The presentation will provide an overview of residential and commercial influent parameters of interest when designing septic systems including black and graywater. Key parameters quantified will be pathogens, organics and nutrients. These parameters will be applied to designing systems based on both hydraulic and organic loading.

3. **Assessment:** Ten questions with 70% passing rate required.

4. **Course Instructor:**

Dr. Sara Heger is a researcher and instructor in the Onsite Sewage Treatment Program in the Water Resources Center and is an Adjunct Assistant Professor in the Bioproducts and Biosystems Engineering Department. For over 20 years, she has been providing education and technical assistance to homeowners, small communities, onsite professionals and local units of government regarding onsite wastewater treatment. She leads the research program at the UMN currently serving as the principal investigator on grants evaluating groundwater mounding and chemicals of emerging concern. She presents at many local and national training events regarding the design, installation, and management of septic systems and related research. Sara is the President of the National Onsite Wastewater Recycling Association and has also served on the board of the Minnesota Onsite Wastewater Association. Sara serves on the NSF International Committee on Wastewater Treatment Systems. She is also the chair of the Minnesota State Advisory Committee on Decentralized Systems. She has BS in Biosystems & Agricultural Engineering and a MS and a PhD in Water Resource Science.

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## Course Agenda

The details of each course are outlined below.

### Course 2 – Time Dosing & Flow Equalization (1 hr.)

1. Reading – References and Presentation Slides
2. One Presentation (50 minutes)

#### **Time Dosing & Flow Equalization Design of Time Dosing and Flow Equalization**

Time dosing is used to control pump “off” and “on” times so wastewater is sent to the next downstream component evenly throughout the day. When activated during high-flow events, a peak enable sensor shortens the rest period between doses to allow the system liquid level to gradually return to normal levels. Flow equalization is a management concept that can help reduce

stress on system performance due to high variation in flows. In flow equalization, the peak flows are stored for a period of time to be delivered to the next downstream component over a longer time period.

3. **Assessment:** Ten questions with 70% passing rate required.

4. **Course Instructor:**

Kevin Sherman has a Bachelor's of Science degrees in Biology and Civil Engineering, Masters Degrees in Biology and Public Health and a Ph.D. in Biological Oceanography. Before becoming Director of Engineering and Regulatory Affairs at SeptiTech, Inc. he was a technical specialist for Presby Environmental, Inc and the Vice President of Engineering for Clearstream Wastewater Systems. Dr. Sherman was the Director of Engineering for Quanics, Inc, directed the Florida Onsite Wastewater Association for 6 years and before that worked for 14 years at the Florida Department of Health. Kevin is past president of the Florida Environmental Health Association and the National Onsite Wastewater Recycling Association. He is a professional engineer in seventeen states and a registered sanitarian. He has been awarded the distinction of being named a diplomat of Water Resources Engineering.

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## Course Agenda

The details of each course are outlined below.

### Course 3 – Gravity Distribution - (1 hr.)

1. Reading – Presentation Slides
2. One Presentation (60 minutes)

#### **Gravity Distribution: Design of Gravity Distribution Soil Treatment Areas**

An onsite wastewater treatment system is a very effective means of treating wastewater and protecting the environment. Gravity dispersal systems, such as gravel trenches, offer an energy free means for dispersal as well as low maintenance and low cost. Gravity dispersal systems represent the most prominent number of installations in the U.S. and Canada and dispersal via gravity will continue to be the most prominent.

3. **Assessment:** Ten questions with 70% passing rate required.

4. **Course Instructor:**

Dennis Hallahan has thirty years of experience with the design and construction of on-site wastewater treatment systems. He has authored several articles for on-site industry magazines and has given numerous presentations nationally on the science and fundamentals of on-site wastewater treatment systems. Dennis also is responsible for product research and testing at universities, test centers and private consultants. His department develops system sizing charts for national and international approvals and assists customers and field representatives in the planning and review of large commercial decentralized systems. Many of these systems are in excess of a million gallons per day. He received his MS in civil engineering from the University of Connecticut

and his BS in civil engineering from the University of Vermont. Dennis is a registered professional engineer in Connecticut. He has been with Infiltrator Water Technologies for 19 years and holds the current position as Technical Director. Dennis also holds patents for on-site wastewater products and is a member of the Water Environment Federation and of the National Onsite Wastewater Recycling Association.

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## Course Agenda

The details of each course are outlined below.

### Course 4 – Collection Systems (2 hr.)

1. Reading – References and Presentation Slides
2. Three Presentations (2 hours)

#### Collection Systems: Collection System Design

Community sewer collection systems have traditionally utilized the standard gravity sewer pipe and manhole construction with the occasional intermediate pump station to move wastewater from multiple connections to a wastewater treatment facility. Gravity systems require larger diameter pipe, expensive manholes, and sufficient elevation change and/or sometimes frequent lift stations. Today there are options that allow for smaller diameter pipe and shallower installations that work with a variety of terrains. This class will describe four options for alternate methods of wastewater collection: 1) Grinder pumps to a low-pressure pipe system; 2) Septic tank effluent pumped to a low-pressure pipe system; 3) Screened septic tank effluent discharged to a gravity sewer; and 4) Vacuum collection systems. A general description of each method, the primary components used in each, primary design factors to be considered, and the pros/cons for each type of collection system will be presented.

3. **Assessment:** Sixteen questions with 70% passing rate required.

4. **Instructors:**

Larry Stephens has spent over 50 years now in the onsite wastewater treatment industry, beginning as a state regulator for 12 years and then as the owner of Stephens Consulting Services, PC for the last 40 years. Stephens Consulting Services is a design engineering company located in Haslett, MI. Onsite wastewater treatment systems, both large and small, have become his focus and specialty. Larry is also a partner with Michael Stephens in a second company, SCS Systems LLC, a 20-year-old company that provides contract operations and maintenance services for onsite systems. Larry holds a B.S. in Civil Engineering from Michigan State University and a Masters of Engineering from the University of Florida. He is a registered professional engineer in Michigan and Ohio. Larry is active and has held leadership positions in both the Michigan Onsite Wastewater Recycling Association and NOWRA.

Michael Saunders has a BS in Civil Engineering from Lakehead University. He has almost 30 years of experience in the field of wastewater starting in consulting and public utilities and then moving to Orenco Systems, Inc. Michael Saunders has 10 years' experience with Orenco Systems, Inc. and currently is the National Sales Manager for commercial and municipal systems at Orenco Systems, Inc.

Scott Hansen has been a designer of Package Fluid Systems for many years, focused on oil field equipment. Currently he is a Pump Market Specialist for Zoeller focusing on Municipal and Commercial Markets, such as Collection Systems, Lift Stations, Low-Pressure Sewer. He also focuses on Field Service for Lift Stations including Low-Pressure Sewer. Zoeller Engineered Products is a supplier of Submersible Pumps, Lift Stations, Control Panels, and associated equipment. His tenure with ZEP is 6 years direct and 12 years as a Manufacturer's Representative.

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## Course Agenda

The details of each course are outlined below.

### Course 5 – Drip Distribution (2 hr.)

1. Reading – References and Presentation Slides
2. Two Presentations (2 hours)

#### **Drip Distribution: Design: Install and O&M of Drip Distribution Systems**

A drip dispersal system is a form of pressurized distribution that utilizes drip irrigation technologies to place effluent below the soil surface. This method is a best available technology to ensure uniform effluent application, especially in shallow soils where it is essential that the effluent comes into contact with the maximum volume of soil. This session will provide a brief introduction to drip dispersal and then provide detailed design guidance. We will review the operation of a drip dispersal system and discuss the hydraulic principles that must be addressed in the design. Finally, we will focus on system installation. There are many details that must be accounted for in the installation in order for the system to provide satisfactory service for many years in to the future.

3. **Assessment:** Twenty questions with 70% passing rate required.

4. **Course Instructors:**

Dr. John R. Buchanan is an Associate Professor and is on the faculty of the Biosystems Engineering and Soil Science Department at the University of Tennessee. He has 34 years of teaching, research, and outreach experience in the areas of onsite and decentralized wastewater management, water supply, water quality and storm water engineering. Dr. Buchanan has B.S. and M.S. degrees in Agricultural Engineering and a Ph.D. in Civil Engineering, all from The University of Tennessee. John is a member of the Water Environment Federation, Soil, NOWRA, and the American Society of Agricultural and Biological Engineers. He is a registered professional engineer in Tennessee.

Dwayne Jones is the owner of Jones Pump Service t/a Bay Area Environmental since 1983. He is the past president of the Maryland Onsite Wastewater Professionals Association (MOWPA), a past board member of NOWRA, and an onsite systems installer, designer/consultant, and service provider.

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## Course Agenda

The details of each course are outlined below.

### Course 6 – Design: Mound Systems (1 hr.)

1. Reading – Presentation Slides
2. One Presentation (60 minutes)

#### Mound System Design

When soil conditions on a wastewater system site are encountered that are not suitable for the installation of a simple tank and leach field system, a raised-bed sand mound system can be used to overcome the site limitations. Sand mounds can be used to overcome shallow groundwater conditions, slowly permeable soils, and soil profiles with shallow limiting layers. A mound system creates conditions where both treatment and treated water dispersal occur in the same component. This presentation will walk you through the design steps to successfully design and build a sand mound system.

3. **Assessment:** Ten questions with 70% passing rate required.

4. **Course Instructor:**

Larry Stephens has spent over 50 years now in the onsite wastewater treatment industry, beginning as a state regulator for 12 years and then as the owner of Stephens Consulting Services, PC for the last 40 years. Stephens Consulting Services is a design engineering company located in Haslett, MI. Onsite wastewater treatment systems, both large and small, have become his focus and specialty. Larry is also a partner with Michael Stephens in a second company, SCS Systems LLC, a 20 year old company that provides contract operations and maintenance services for onsite systems. Larry holds a B.S. in Civil Engineering from Michigan State University and a Masters of Engineering from the University of Florida. He is a registered professional engineer in Michigan and Ohio. Larry is active and has held leadership positions in both the Michigan Onsite Wastewater Recycling Association and NOWRA.

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## Course Agenda

The details of each course are outlined below.

### Course 7 – Design: Pumps and Controls (1 hr.)

1. Reading – Presentation Slides
2. One Presentation (60 minutes)

#### Incorporating Pumps & Controls into Design

This session will look at how using controlled dosing through pumps can offer many advantages to your onsite treatment system design. We will discuss dosing control, volume control, directional control, and flow equalization. We will also discuss operational data collection and system monitoring through control panels.

3. **Assessment:** Ten questions with 70% passing rate required.

4. **Course Instructor:**

Mike Stephens has been in the onsite septic system industry for 24 years. He spent 22 years working in operation and maintenance of advanced, commercial, and community wastewater treatment systems. His previous service company operated over 30 community collection and treatment systems, as well as over 800 commercial and residential systems each year. Triaging and troubleshooting pump and control issues became his specialty. The company was sold in 2020 when Mike was hired by a wholesale distributor to work in the Wastewater Products division for 13 branches in Michigan, Indiana, and Ohio. Mike is a Certified Wastewater Operator for both Municipal & Industrial/Commercial facilities in Michigan. He is a past presenter at WWETT, served on a NOWRA committee, and has been an officer in MOWRA. He holds a B.A in Business Administration from Cornerstone University.

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## Course Agenda

The details of each course are outlined below.

### Course 8 – Design: Introduction to Nitrogen Removal (1 hr.)

1. Reading – Paper and Presentation Slides
2. One Presentation (60 minutes)

#### Introduction to Nitrogen Removal (1 hr.):

While nitrogen is an essential nutrient for living organisms, too much nitrogen in the environment can impact environmental and public health. When nitrogen leaches into water supplies, especially groundwater, nitrate-nitrogen can lead to methemoglobinemia. This is a condition where the blood is unable to carry oxygen properly and the term 'blue baby syndrome' is often used to describe children affected. In water environments, excess nitrogen leads to excess algal growth with die-off resulting in low dissolved oxygen levels in surface waters. The nitrogen cycle is complex and the form of nitrogen changes as it moves through plants, animals, and the environment. Understanding the factors that influence changes in the nitrogen form, allows us to develop treatment systems that capitalize on those natural processes to optimize the removal of nitrogen to the atmosphere. The nitrogen cycle and the environmental conditions that go with each phase will be presented. Various wastewater treatment processes will be explained that capitalize on the biological reduction of nitrogen. Key control points such as aeration and alkalinity will be examined.

3. **Assessment:** Ten questions with 70% passing rate required.

4. **Course Instructor:**

Allison Blodig has been in the onsite wastewater treatment industry since 1997 and has worked most of her career in the wastewater treatment manufacturing industry and was recently a Wastewater Treatment Systems Specialist for Infiltrator Water Technologies. Along with a degree in Biology from Benedictine College in Atchison, KS, she has been a Registered Environmental Health Specialist and member of the National Environmental Health Association since 1996. She is also very

active with the National Onsite Wastewater Recycling Association (NOWRA) and is the President Elect. Allison received the Women in Manufacturing award in 2012 and was the 2017 recipient of the Raymond Peat Lifetime Achievement award for outstanding achievement in the Kansas onsite wastewater field.

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## Course Agenda

The details of each course are outlined below.

### Course 9 – Design: Benefits of Decentralized Wastewater Treatment (1.5 hrs.)

1. Reading – Paper and Presentation Slides
2. One Presentation (90 minutes)

#### Benefits of Decentralized Wastewater Treatment

Centralized Wastewater Treatment Systems, often called ‘big pipe’ systems, collect and treat wastewater from a large geographic area with diverse inputs and generally discharge treated wastewater to surface water. These are the systems that most people are familiar with when they think of wastewater treatment. Centralized systems benefited from the passage of the Clean Water Act (CWA) in 1972 and the accompanying grant funding that built, repaired, and upgraded thousands of treatment systems around the United States in the 1970s and 1980s. Since then communities have grown, treatment standards have increased, and the CWA funds to repair, upgrade and/or expand those WWTPs have become increasingly limited. “Decentralized system” has become a commonly-used term to describe a wastewater treatment system that treats and disperses wastewater from individual homes or a cluster of homes at or near the source of the wastewater discharge. These systems take advantage of the vast capacity of soil to remove or transform pollutants that are in the effluent as it percolates through the soil thereby avoiding point discharges to surface waters and maintaining the quality and quantity of our groundwater. By definition, decentralized onsite wastewater treatment systems are a ‘green technology’ because treated effluent recharges local aquifers. A new innovation in decentralized wastewater management is the reuse or recycling of treated effluent. With appropriate safeguards, local regulations or bylaws may allow the treated water to be used for irrigation, toilet and urinal flushing or make-up water for commercial boilers. These applications reduce the demand for potable water and aid in the protection and preservation of the available water sources. As society demands more efficient use of financial resources and sustainable environmental wastewater management, the use of managed decentralized wastewater treatment systems is a key support structure for wastewater reuse. This presentation will explore the pros and cons of centralized and decentralized systems and how they can be used to complement each other in an overall wastewater strategy.

3. **Assessment:** Fifteen questions with 70% passing rate required.

4. **Course Instructor:**

Dennis Hallahan has thirty years of experience with the design and construction of on-site wastewater treatment systems. He has authored several articles for on-site industry magazines and has given numerous presentations nationally on the science and fundamentals of on-site wastewater treatment systems. Dennis also is responsible for product research and testing at



universities, test centers and private consultants. His department develops system sizing charts for national and international approvals and assists customers and field representatives in the planning and review of large commercial decentralized systems. Many of these systems are in excess of a million gallons per day. He received his MS in civil engineering from the University of Connecticut and his BS in civil engineering from the University of Vermont. Dennis is a registered professional engineer in Connecticut. He has been with Infiltrator Water Technologies for 19 years and holds the current position as Technical Director. Dennis also holds patents for on-site wastewater products and is a member of the Water Environment Federation and of the National Onsite Wastewater Recycling Association.

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### Assessments

Within each course there is a pre-test where the learner must affirm and attest that they are the individual registered to take this course and that they will not seek out, nor accept, any assistance in the completion of this course. At the end of each presentation there is a quiz the participant must pass with a score of 70% or better to obtain credit. If the student passes, they may move on. If they do not pass, they have the opportunity to review materials and take the quiz as many times as they need to pass. The presentations must be watched start to finish (no fast forwarding) and the student must complete the sections in sequential order.

### Course Completion

Upon completion, the student is provided a certificate of completion (example shown below).



## Contact Information

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