



Online Learning Academy

March 2021

Design Course Overview – Part 1

NOWRA has developed 7 courses in the critical area of design of decentralized systems. These courses lay the groundwork for design and will be expanded over the next several years. This national training course with five different instructors 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 can either take the 10-hour class in its entirety or break it into smaller sections based on how many hours they need or their interest. The hours assigned for each section are based on the time it took others 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 Design curriculum is made up of the following courses which can be taken as an entire bundle, in smaller bundles or as individual courses.

1. Design Bundle (10 hours total): https://www.pathlms.com/nowra/product_bundles/1933
 - a. Overview (1 hr): <https://www.pathlms.com/nowra/courses/29029/>
 - b. Septic Tanks (1 hr): <https://www.pathlms.com/nowra/courses/29046/>
 - c. Aerobic Treatment Units (1.5 hr) : <https://www.pathlms.com/nowra/courses/29024/>
 - d. Soil Properties (2 hr): <https://www.pathlms.com/nowra/courses/29047/>
 - e. Soil Water Movement (1.5 hr): <https://www.pathlms.com/nowra/courses/29048/>
 - f. Making Infiltrative Decisions (1.5 hr): <https://www.pathlms.com/nowra/courses/29050/>
 - g. Pressure Distribution (1.5 hr): <https://www.pathlms.com/nowra/courses/29035/>
2. Design Bundle – Overview and Septic Tanks (2 hr), a and b: https://www.pathlms.com/nowra/product_bundles/1934
3. Design Bundle – Soils for Design (3.5 hr), d and e: https://www.pathlms.com/nowra/product_bundles/1935
4. Design Bundle - Soil Treatment Systems (3 hr), f and g: https://www.pathlms.com/nowra/product_bundles/1936

Course Agenda

The details of each course are outlined below.

Course 1 - Design: Overview (1 hr)

1. Reading – Presentation slides

2. Presentation (61 minutes) - The presentation explains the procedures for the design, installation, and maintenance of onsite wastewater treatment systems. We know we must follow the codes and regulations, but we also need to know why the codes and regulations exist – to ensure that the wastewater treatment and dispersal system is protective of public and environment health. That means that our treatment system removes the wastes and pathogens from wastewater and returns safe water back into the groundwater. In this presentation, Dr. John Buchanan from the University of Tennessee, provides a narrative how an onsite system should be designed, should be installed, and should be maintained in order to achieve the ultimate goal of protecting public and environmental health. The presentation provides a general overview of the design, installation, and maintenance process and is applicable for installers, service providers, soil evaluators, and engineers at any location.
3. Assessment: 10 questions with 70% passing rate required
4. Course Instructor: 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 29 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 and Water Conservation Society, NOWRA, and the American Society of Agricultural and Biological Engineers. He is a registered professional engineer in Tennessee.

Course 2 - Design: Septic Tanks (1 hr)

1. Reading: PowerPoint slides
2. Presentation (45 minutes) - The decentralized onsite wastewater system is comprised of a series of elements that each serve a purpose in the treatment process. These elements differ based on region, wastewater strength and desired effluent quality standards, but most systems all start with one essential structure: the septic tank. The design of this tank is key to the effectiveness of the entire system. It not only provides an environment for physical separation through floating and settling but should also serve as the catalyst for initial biological treatment as well. During this course, we will examine how tank designs have evolved and what are the essential key aspects for an effective septic tank. We will discuss the importance of watertightness and how to maintain it. We will identify factors that can maximize retention time to lower demand on downstream processes. We will go beyond conventional tanks and discuss newer technologies that can be incorporated into the septic tank to increase its effectiveness and expand its capacities. We will review national and international standards that apply to septic tanks.
3. Readings: CIDWT Septic Tank Course Materials and Operational Checklist
4. Assessment: 10 questions with 70% passing rate required
5. 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 more than 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.

Course 3 - Design: Aerobic Treatment Units (1.5 hr)

1. Reading: PowerPoint slides
2. Presentation (83 minutes) - Aerobic treatment unit design for residential systems is typically done by applying units certified to the NSF Standards 40 and 245 based on flows prescribed by regulations provided by local and state entities. This training will discuss the NSF testing regime and general criteria used to size larger versions of tested units. It will also discuss how these units are not as easily applied to strict effluent requirements like low total nitrogen requirements or commercial applications. It will also review what design criteria should be considered when addressing these applications. This course will explore the requirements to treat wastewater in general and the role design plays in the longevity and sustainability of the ATU system. It will review the different types of ATU technologies and then discuss commercial projects and the challenges that different projects bring.
3. Reading: CIDWT Operational Checklist: Aerobic treatment unit
4. Assessment: 10 questions with 70% passing rate required
5. Instructor: Allison Blodig has been in the onsite wastewater treatment industry since 1997, first as a regulatory official and then in the wastewater treatment manufacturing industry participating in sales, regulatory affairs, design reviews, and training for a national treatment system manufacturer. Currently she is an Engineered Systems Specialist with Infiltrator Water Technologies, a leading developer of decentralized wastewater treatment technology. 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 current President-Elect.

Course 4 - Design: Soil Properties (2 hours)

1. Reading: PowerPoint Slides
2. Presentation (1 hr and 44 minute) - Soil is an integral component of onsite wastewater systems. Its major functions are to serve as a base to disperse effluent into or onto the earth; a critical treatment component; and serve as a repository to cycle nutrients and water into the local watershed. Discussion of fundamental soil properties such as texture, clay mineralogy, color, and soil structure of the internal soil profile will be presented along with soil landscape characteristics. Emphasis of soil properties which influence treatment and dispersal of effluent will be provided as well as modified by landscape position.
3. Reading: [NRCS Guide to Texture by Feel](#)
4. Assessment: 10 questions with 70% passing rate required
5. Instructor: Dr. Randy Miles is an Emeritus Faculty of the Soil Science program at the University of Missouri. He was Director of the Missouri Soil Health Assessment Center, Director of the Missouri SmallFlows Wastewater Education/Research Training Center, Director of Historical Sanborn Field, the third oldest continuous research field in the world, and curator of the Historical Duley-Miller soil erosion plots. He also worked in the soil genesis, morphology, and soil survey area. He also is principle owner of Randall J. Miles, LLC which provides soil assessments for many different land uses plus educational workshops and seminars for professional certification and continuing education.

Course 5 - Design: Soil Water Movement (1.5 hours)

1. Reading: PowerPoint slides
2. Presentation (1 hour, 5 minutes) - The movement of water in soils is complex and multi-faceted. Essentially water moves as saturated flow or unsaturated flow. Under saturated flow conditions, water moves in all pores large and small. All the pores are filled with water leaving no volume for air. Under unsaturated flow water moves along the surfaces of the soil solids with the larger pores containing air. Water movement under saturated conditions is faster than under unsaturated conditions with the resulting treatment being greater with unsaturated conditions because of the close proximity of air (oxygen) and interaction with soil solid surfaces which possess chemical treatment properties and serve as host sites for soil microbes. The role of gravity and pressure dosing of effluent for dispersal will be discussed relative to the influence of water and effluent movement in soil treatment areas.
3. Video: [Water Movement in the Soil](#) (17 minutes)
4. Instructor: See above.

Course 6 - Design: Making Infiltrative Decisions (1.5 hours)

1. Reading: PowerPoint slides
2. Presentation (1 hr, 10 minute) - The design of onsite systems is often very prescriptive, codes dictate many aspects of the design. However, the design of the infiltrative surface is one variable that designers are expected to be able to make decisions. Soils depth, type, siting location, wastewater characteristics and many other variables need to be well understood to provide a system that will have good longevity and more importantly protect public health. This presentation will review the boundary conditions that determine best practices for infiltrative surface design.
3. Reading: [EPA descriptions of types of soil treatment systems](#)
4. Assessment: 10 questions with 70% passing rate required
5. Dennis Hallahan – see above.

Course 7 - Design: Pressure Distribution (1.5 hr)

1. Reading: PowerPoint Slides
2. Presentation (1 hr, 10 minutes) - Low pressure pipe systems use a pump to move effluent to an infiltrative surface under pressure. The goal of this approach is to uniformly dose, then rest this surface multiple times per day. The availability of free or low-cost spreadsheet and computer programs has made the analysis of lpp designs accessible. Special areas of concern such as designs on sloping lots and in freezing conditions will be discussed. This presentation aims to provide a standard of practice highlighting the advantages of the pressure distribution approach, illustrating key decisions via a design example, sharing typical calculations, describing tricks, traps, rules of thumb, and designs that promote constructability and ease of operation and maintenance.
3. Video: [SSPMA Effluent pumps for Onsite Wastewater Treatment Systems](#) (28 minutes)
4. Assessment: 15 questions with 70% passing rate required
5. CIDWT Operation checklist: Low Pressure Drainfield
6. Instructor: Kevin Sherman has a Bachelor of Science degrees in Biology and Civil Engineering, master's 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.

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 course 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 attached).



Sample Course

Certificate of Completion

Johnny Certificate

3/5/21

Credits/Hours

0.0

A handwritten signature in black ink, which appears to read 'Tom Groves'.

Tom Groves, Executive Director, NOWRA