

CEE 699

Design of Natural Treatment Systems

- Catalog data:** 20-CEE-699. Design of Natural Treatment Systems. 3 ug./gr. cr.
Land based and aquatic based natural treatment systems. Application of hydrodynamic principles, reactor theory, nutrient cycling and Monte Carlo simulation in reliability based design of constructed wetlands for treating wastewater.
- Prerequisites:** Senior standing
- Textbook:** Kadlec and Knight (1996) *Treatment Wetlands*, Lewis Publishers
- References:** USEPA (1999), *Constructed Wetlands Treatment of Municipal Wastewaters*, 625/R-99/010.
Reed, Middlebrooks and Crites (1995) *Natural Systems for Waste Management and Treatment*, McGraw-Hill Book Co.
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- Goals:** To examine the promise and perils of natural systems for treating wastewater; to apply reliability-based design methods to a natural treatment system.
- Lecture or lab topics:**
1. Land based natural treatment systems (2 classes)
 2. Aquatic based natural treatment systems (2 classes)
 3. Natural and constructed wetland ecosystems (2 classes)
 4. Wetland processes-1: hydrodynamics (2 classes)
 5. Wetland processes-2: physical-chemical mechanisms (2 classes)
 6. Wetland processes-3: nutrient dynamics (2 classes)
 7. Constructed wetlands: guidelines, limits, regulations (2 classes)
 8. Conventional versus reliability-based design (2 classes)
 9. Plants, pests, construction, O&M, and economics (2 classes)
 10. CWWT case studies from Ohio, Indiana, and Kentucky (2 classes)
- Computer usage:** Students run interactive computer program (HydroSim) to simulate BOD removal in a free water surface wetland under stochastic operating conditions.
- ABET criterion 3:** a, c, d, g, k
- ABET criterion 8:** a, b, e, g
- Date prepared:** December 20, 2002
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