

ADVANCED WETLAND SOILS AND MITIGATION

CSES 5864

I. Catalogue Description

Wetland soils as components of natural landscapes and their interactions with hydrologic systems. Hydric soil identification and delineation, preparation of wetland water budgets, restoration of damaged wetlands, and creation of compensation wetlands. Utilization of advanced soil information systems and GIS/GPS in wetlands study. Constructed wetlands for nutrient removal and acid mine drainage treatment. Pre: 5114. (3H, 3C).

Course Number: CSES 5864

ADP TITLE: Adv Wetland Soils & Mitigation

II. Learning Objectives

Upon completion of the course, students will be able to:

- A. Discuss and apply legal and scientific wetland terms, concepts, and regulations.
- B. Relate the chemical, physical, biogeochemical, and morphological characteristics of wetland soils to their location, role, and function in the landscape.
- C. Identify individual wetland soils based upon use of Hydric Soil Indicators, *Soil Taxonomy*, and other appropriate techniques to currently accepted federal/state regulatory standards.
- D. Apply essential principles of wetland restoration and creation to develop a proposed mitigation site design and develop site-specific success criteria.
- E. Design appropriate soil and hydrologic monitoring and study procedures for natural and created wetlands, including appropriate GIS/GPS technologies.

III. Justification

The proposed new online Master's degree program, "Professional Studies in Agricultural and Life Sciences" will provide a broad, professional, graduate degree for persons whose careers or interests lie in the areas of the agricultural and life sciences industries, governmental agencies working with agriculture, Extension, and agricultural education teachers. An electronic survey was done in Fall 2004 of agricultural and life sciences clients to determine their interest in this type of degree, their preferences for information delivery, and their interest in particular courses and topics. Career advancement and professional growth were given as the top two reasons why respondents would be interested in a Master's degree. Survey results indicated that courses should provide current training to professionals needing to either broaden or to enhance their skills. Survey results also showed that there is a need for an online Master's degree in agriculture and life sciences, the program should be delivered entirely online, and that it should be modular so that it could fit the needs of place-bound learners.

CSES 5864 addresses the goals of the online degree program. Accurately delineating natural wetland soils and planning for the appropriate restoration or creation of new wetlands are critical emerging skills for graduate students in the biological, earth, and environmental sciences. Both private and public sector

employers of M.S. students commonly require a detailed knowledge of wetland soils, functions, and values. This course will offer advanced material on a range of wetland topical areas along with extensive scientific literature readings and preparation of five project reports.

IV. Prerequisites and Co-requisites

CSES 5114 Soils for Professionals (or an equivalent course, such as CSES 3114). Students must have a background in soil morphology, landscape relations, regional parent materials, and soil/plant relations to be able to deal effectively with the material covered in this course.

V. Texts and Special Teaching Aids

A. Required Text

Richardson, J.L. and M.J. Vepraskas (eds.) 2001. **Wetland Soils: Genesis, Hydrology, Landscapes and Classification**. Lewis Publ., Boca Raton, FL. 417 pp.

B. Approximately 20 journal articles and agency reports will be used as required readings and supplied to students. Examples

1. Vepraskas, M. J. 1995. Redoximorphic Features for Identifying Aquic Conditions. NC Agric. Research Serv., Tech. Bull. 301, Raleigh. 33 pp.
2. Patrick, W.H., R.P. Gambrell and S.P. Faulkner. 1996. Redox measurements in soils. pp. 1255-1274 *In: Methods of Soil Analysis, Part 3, Chemical Methods, SSSA Book Series no. 5, ASA-SSSA, Madison WI.*
3. He, X, M.J. Vepraskas, D.L. Lindbo and R.W. Skaggs. 2003. A method to predict soil saturation and frequency and duration from soil color. *Soil Sci. Soc. J.* 67:961-969.
4. Vepraskas, M.J. and S.W. Sprecher. 1997. Overview of aquic conditions and hydric soils. pp. 1-28 *In: Aquic Conditions and Hydric Soils: The Problem Soils. SSSA Special Pub. 50, ASA-SSSA, Madison WI.*
5. Whittecar, G.R. and W. L. Daniels. 1999. Use of hydrogeomorphic concepts to design created wetlands in southeastern Virginia. *Geomorphology* 31: 355-371.
6. Stolt, M.H., M.H. Genthner, W.L. Daniels, V.A. Groover, S.M. Nagle, and K.C. Haering. 2000. Comparison of soil and other environmental conditions in constructed and adjacent palustrine reference wetlands. *Wetlands* 20(4): 671-683.

VI. Syllabus

Topics	% of Course
Introduction and overview	7
Wetland definitions and regulatory framework	7
Wetland soil biogeochemistry	7
Physical properties of wetlands soils	7
Wetland soil hydrology and water budgets	7
Wetland soil morphology	7
Redoximorphic features and hydric soil indicators	7
Wetland soil landscape relationships	7
Delineation of hydric soil in agricultural landscapes	7
Hydrogeomorphology and other geomorphic classification systems	7
Hydric soils and Soil Taxonomy	6
Mid-Atlantic and Southeastern wetlands and associated soils	6
Constructed wetlands for water treatment	6
Wetland mitigation principles	6
Restored and constructed mitigation wetlands	6
Total	100

VII. Old (current) Syllabus-in the case of a revised course

Not applicable

VIII. Core Curriculum guidelines-if inclusion in the University Core is desired

Not applicable