

ERE 674 Methods in Ecological Treatment Analysis

Instructor: Dr. Wendong Tao

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Office hours on Monday 1:30 pm to 3:00 pm

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Class: Tu and Th 2:00 – 3:20 pm @Baker 141

Lab: Tu and Th 2:00 – 3:20 pm @Baker 108

Additional time is required (0-4 hours, varying with the labs) and need to be scheduled on a group basis

Course Description

2 hours of lecture/seminar/discussion and 2-5 hours of lab per week. Introduction to the principles and applications of laboratory methods in analysis of natural and engineered ecosystems for water quality improvement. Common lab exercises for a comprehensive analysis of an engineered ecosystem, including water quality, reaction kinetics, hydraulic characteristics, vegetation, soil and gravel, and microbial community. Discussion on experimental procedures and data analysis. Spring. 3 credit hours.

Prerequisite: General chemistry with lab; general knowledge of water quality. GAs and RAs must have passed an environmental and chemical safety training session.

Class Capacity: 9 (3 groups)

Suggested Readings:

- Standard Methods for the Examination of Water and Wastewater, 21st ed. 2005. APHA/AWWA/WEF. Moon Library - Reference. Call #: QD142 .A5 2005.
- C. N. Sawyer, P.L. McCarty, and G.F. Parkin. 2003. Chemistry for Environmental Engineering and Science, 5th ed. McGraw Hill Higher Education. Sci/Tech Lib. Call #: TD193 .S28 2003.

Laboratory Exercises:

- Lab #1: Lab safety and orientation of Ecological Engineering Laboratory and A&TS Chemical Stockroom.
- Lab #2: Solids analysis of water/wastewater and biofilm samples.
- Lab #3: Alkalinity of water/wastewater.

- Lab #4: COD and BOD in water/wastewater.
- Lab #5: NH_3 , NO_2^- , and NO_3^- in water/wastewater.
- Lab #6: Acid digestion of water/wastewater and plants/sediment for TKN and TP.
- Lab #7: Determination of TKN, orthophosphate and TP.
- Lab #8: Analysis of physical properties of gravel and soil.
- Lab #9: Hydraulic conductivity of sand and gravel.
- Lab #10: Microscopic observation/enumeration of microorganisms.
- Lab #11: Reaction kinetics of COD or NH_3 removal or batch adsorption of copper.

Course Outcomes

After completing this course, the students should be able to:

1. Use common lab skills to characterize water/wastewater quality and evaluate the performance of natural/engineered ecosystems in improving water quality;
2. Quantitatively characterize the components and internal processes of natural and engineered ecosystems; and
3. Design and conduct experiments to explore design considerations of engineered ecosystems.

Relation to ERE Program Outcomes

(I = Introduction, R = Reinforce, E = Emphasize, A = assessment point)

- (a) [] an ability to apply knowledge of mathematics, science, and engineering
- (b) [E] an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) [] an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) [] an ability to function on multidisciplinary teams
- (e) [] an ability to identify, formulate, and solve engineering problems
- (f) [] an understanding of professional and ethical responsibility
- (g) [I] an ability to communicate effectively
- (h) [] the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) [] a recognition of the need for, and an ability to engage in life-long learning
- (j) [] a knowledge of contemporary issues
- (k) [E] an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Grading

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| a. | Group presentation/Discussion (Lab # 2-9) | 10% x 8 |
| b. | Individual lab report (Lab #11) | 15% |
| c. | Participation in lab exercises | 5% |

Each presentation is 15-20 minutes plus Qs/As. Qs&As can be during or after each presentation. Guidelines on presentations and lab reports:

1. Title page -- course code and title, semester; lab title; student name, partner's name; date of submission.
2. Objectives of this lab -- in your own language, rather than copying the lab manual.
3. Materials and Methods – you can refer to the Materials and Procedures sections of the lab manual, but summarize the materials and methods used and indicate any corrections and changes made during the lab as well as any additional information given during the lab.
4. Data and Results -- complete the Data Sheets/Tables in the lab manual, sample calculations, and calculated results either in text or illustrations.
5. Discussion –significance of the lab skills/experiments to water/wastewater research; interferences and cautions you learned from this lab; implications of the results to the ecosystems where the samples are collected; and responding to discussion Qs.

Students with Learning and Physical Disabilities

SUNY-ESF works with the Office of Disability Services (ODS) at Syracuse University, who is responsible for coordinating disability-related accommodations. Students can contact ODS at 804 University Avenue- Room 309, 315-443-4498 to schedule an appointment and discuss their needs and the process for requesting accommodations. Students may also contact the ESF Office of Student Affairs, 110 Bray Hall, 315-470-6660 for assistance with the process. To learn more about ODS, visit <http://disabilityservices.syr.edu>. Authorized accommodation forms must be in the instructor's possession one week prior to any anticipated accommodation. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

Academic Dishonesty

Academic dishonesty is a breach of trust between a student, one's fellow students, or the instructor. By registering for courses at ESF you acknowledge your awareness of the ESF Code of Student Conduct

(<http://www.esf.edu/students/handbook/StudentHB.05.pdf>), in particular, academic dishonesty includes but is not limited to plagiarism and cheating, and other forms of academic misconduct. The Academic Integrity Handbook contains further information and guidance (<http://www.esf.edu/students/integrity/>). Infractions of the academic integrity code may lead to academic penalties as per the ESF Grading Policy (<http://www.esf.edu/provost/policies/documents/GradingPolicy.11.12.2013.pdf>).