

**College of Science and Health
Department of Environmental Science
Course Outline**

1. TITLE OF COURSE AND COURSE NUMBER: Soil and Water Analysis
ENV 070, 2 credits

2. DESCRIPTION OF THE COURSE: This course acquaints the student with the fundamentals of soil and water analysis. The course emphasizes fieldwork and the measurement of chemical, physical, and biological properties of soil and water samples.

3. COURSE PREREQUISITES: ENV 115, CHEM 161 or permission of instructor

4. COURSE OBJECTIVES: To make the student competent in analytical methods of soil and water samples and to provide a body of knowledge from which the student can make decisions regarding land use for buildings, agriculture, waste disposal, or soil and water management.

5. STUDENT LEARNING OUTCOMES:
Upon completion of this course students should be able to:
 1. Effectively express themselves in written and oral form
 2. Demonstrate the ability to think critically
 3. Locate and use information
 4. Demonstrate the ability to integrate knowledge and ideas in a coherent and meaningful manner
 5. Work effectively with others
 6. Perform field measurements and collect samples according to accepted professional standards
 7. Design and carry out analytical laboratory analyses consistent with NJDEP, EPA and all industry standards for certified analyses
 8. Present analytical results in a thorough, consistent, accurate and readable format.
 9. Integrate field observations, analytical results and discipline fundamentals into a coherent interpretation of results.

6. TOPICAL OUTLINE OF THE COURSE CONTENT:

(Some laboratories may take up more than one week)

- I. Introduction – Field & Laboratory Standard Practice
- II. Field Methods and Instrumentation - Soil & Water Properties & Sampling
- III. Macroinvertebrate Sampling and Discharge Measurements
- IV. Microbiology of Water Samples
- V. Sample Preservation and Soil Texture I - Sieve Analysis

- VI. Soil Texture II - Hydrometer and Pipette Analysis
- VII. Soil Water and Organic Content; Bulk Density and Porosity
- VIII. pH and Titrimetric Methods – Alkalinity, Winkler DO, and Hardness
- IX. Spectrophotometric Methods - Phosphorous, Silica, and Aluminum
- X. Atomic Absorption Cation Analysis
- XI. Ion Chromatography Anion Analysis
- XII. Soil Mineral Identification by X-Ray Diffraction Analysis

7. GUIDELINES/SUGGESTIONS FOR TEACHING METHODS AND STUDENT LEARNING ACTIVITIES:

Field work, demonstrations, hands-on analyses

8. GUIDELINES/SUGGESTIONS FOR METHODS OF STUDENT ASSESSMENT (STUDENT LEARNING OUTCOMES):

Reports on individual labs, final summary lab report

9. SUGGESTED READINGS, TEXTS, OBJECTS OF STUDY:

“Laboratory Manual for Soils; 3rd ed.”, Pardi, R.; William Paterson University, 2007
 “Standard Operating Procedures for Water Analysis at the Rosengren Field Station NJDEP Certified Laboratory”; 1st ed., Pardi, R.; William Paterson University, 2008

10. BIBLIOGRAPHY OF SUPPORTIVE TEXTS AND OTHER MATERIALS:

"The Nature and Properties of Soils; 13th ed.", Brady, N.C. and Weil, R.R.; Prentice Hall Publishing Co., Inc., 2002.
 Brady, N.C., and Weil, R.R., 2004, Elements of the Nature and Properties of Soils: 2nd ed., Pearson/Prentice Hall Publishing, Upper Saddle River, NJ.
 Eaton, A.D., Clesceri, L.S., Rice, E.W., and Greenberg, A.E., eds., 2005, Standard Methods for the Examination of Water and Wastewater, 21st ed., APHA/AWRA/WEF, Washington, D.C.
 "Fundamentals of Soil Science", Foth, H.D.; John Wiley and Sons, 1978
 "Learning Manual and Lectures Outlines for Soil Science 051", Foth, H.D., Cooper, T.H., and Rieke, P.E.; Crop and Soil Sciences Department Michigan State University, 1975
 "Clay Mineralogy", Grim, R.E.; McGraw-Hill Book Co., 1968
 "Soil and Water", Hillel, D.; Academic Press, 1971
 "Soil Conservation", Kohnke, H., and Bertrand, A.R.; McGraw-Hill Book Company, 1959
 Miller, R.W., and Gardiner, D.T., 2001, Soils in Our Environment, Pearson/Prentice Hall Publishing, Upper Saddle River, NJ.
 "Laboratory Manual for Introductory Soils", Sabey, B.; Stipes Publishing Company, Champaign, Illinois, 1967
 Skoog, D.A., Holler, F.J., and Crouch, S.R., 2007, Principles of Instrumental Analysis, 6th ed., Thomson Publishers.
 "The Soils of New Jersey", Tedrow, J., Rutgers University Press, New Brunswick, 1985.

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Willard, H.H., Merritt Jr., L.L., Dean, J.A., and Settle, Jr., F.A., 1988, Instrumental Methods of Analysis, 7th ed., Wadsworth Publishing Co., Belmont, California.

Zhang, C., 2007, Fundamentals of Environmental Sampling and Analysis, Wiley & Sons, 464 pp.

11. PREPARER'S NAME AND DATE: Richard Pardi, Spring 2008
12. ORIGINAL DEPARTMENTAL APPROVAL DATE: February 15, 2008
13. REVISER'S NAME AND DATE:
14. DEPARTMENTAL REVISION APPROVAL DATE: