EVS 300/301
Physical Features of Ecosystems

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Fall, 2016

The most powerful organizing principle for the environmental sciences is the Ecosystem. In general, ecosystems include both abiotic and biotic factors, which interact with each other and whose characteristics cannot be completely understood except in the context of the ecosystem as a whole.

Nevertheless, it is meaningful to analyze the ecosystem in terms of both its abiotic (non-living, or geological) and biotic (living, or biological) factors. The sequence EVS 300-303 will build a comprehensive model of the ecosystems that we meet both in our research and in our everyday lives, as well as the significance of conservation of key features of these ecosystems. We will start with the physical components of ecosystems. We have two goals in doing this. From an ecological perspective, we will first explore how the physical features of ecosystems interact with living communities, both in nature and as they are affected by human activities, and second try to provide a context for the detailed discussion of the biotic factors in EVS 302. From a practical perspective, it is the physical features of ecosystems that tend to be the focus of environmental regulation, and few aspects of the modern economy are more regulatorally driven than environmental protection. Our treatment of these issues will include both natural and altered environments, capturing their breadth and excitement. It will show how the science of ecosystems links with other disciplines such as law, planning, economics, etc. You will be expected to approach material at a high level and to emerge with a significant understanding of the issues, tools, and details of the abiotic components of ecosystems.

The textbook for this course is *Environmental Geology* by Edward a. Keller. This book is available in the University Bookstore and at a reasonable price from other sources. The current edition of this book is the 9th edition; however since books of this sort seldom change much from edition to edition (except for price), students may wish to purchase the 8th edition. The schedule below gives chapter references for the 9th edition; appropriate chapters for each part of the course may be different in earlier edition. Students should read the appropriate parts of the text as the course progresses.

Evaluation in this course is intended to provide a vehicle for you to synthesize materials from various parts of the course, to develop a meaningful perspective on the materials of the course, and to demonstrate that you have a thorough understanding of the material. The key, of course, is ultimately understanding. Most of you do not need to memorize terms. What *is* important to *all* of you is to be able to address and deal with problems scientifically and to understand how the processes that affect the earth affect your lives. Evaluation will stress your ability to deal with meaningful situations in a rational and logical way. There will be two examinations, a midterm and a final. Both will consist of essay questions and will be administered in a way that will enable you to have time to think about your answers.

The laboratory (EVS 301, *which is required*) involves lab reports for each exercise. Please note that much of your grade on the examinations and lab reports will depend on your ability to express yourselves effectively in English logically and efficiently. This is not a writing-across-the-curriculum course. Even so, effective and efficient expression of technical ideas is fundamental to your being taken seriously as an educated environmental scientist, and your grade will be based on your ability to express yourself accurately, effectively and appropriately, both in regard to the questions asked in examinations and in the material covered in the laboratory. You will need to be able to make a cogent argument and demonstrate that you understand the material and can apply it to practical issues.

Students in EVS 300/301 are responsible for all announcements made in class.

The Midterm Examination will occur after we have completed the "Water Resources, Water Use Patterns, Water Pollution, and Flooding" section of the course, most likely during the 7th week. The Final Examination will be made available during the last week of class and will be due at the time of the regularly scheduled final examination for a course offered at this time. Laboratory reports will follow each laboratory exercise.

EVS 301 is the laboratory which accompanies EVS 300. To the degree possible, the laboratories will be integrated with the lectures in EVS 300. Students in either of these courses must be registered in the other as well. Grades from both courses will be commingled and averaged together, with the same grade given for both courses; materials from both courses will be included in the grade. The function of the laboratory is to provide students with hands-on experience in significant environmental issues by experimenting with them, analyzing real instances of the issues, or seeing them first-hand on field trips. It is not appropriate to separate hands-on experiences from lectures for purposes of grading, and we will not do so.

This course includes several field trips. Except for the final field trip, they are scheduled for the Thursdays and Fridays shown in the syllabus, and students should adjust their schedules on these days so that they can attend the field trips. Students who, for various reasons, cannot adjust their work schedules must demonstrate their inability to do so to the course instructor and the teaching assistant responsible for the lab, and they must arrange to carry out an independent-study field trip equivalent to the trip they missed. Individual field trips may last somewhat longer than the 2 hours scheduled for laboratories in the course, but we will try as much as possible to hold to the 2-hour schedule. The final field trip is an all-day trip to the Conesville Power Plant in Coshocton County. We will try to schedule this trip to minimize problems to students' schedules. Details for the precise scheduling for this field trip will be discussed with students to ascertain what makes the most sense for all concerned. In the past, this has been accomplished by a trip on Thursday attended by all students.

Each laboratory or field trip will require a laboratory report. These reports will be turned in at the beginning of the subsequent scheduled laboratory. Grades in EVS 301 will be based on these reports. Any student who misses any laboratory or field trip without *first* arranging for an alternative will get the grade of 'F' for the report on that laboratory. Students should note that grades for EVS 301 laboratory reports will be based at least in part on effective use of the English language. This may not be a writing course, but you should take effective report-writing seriously.

Schedule – Note that the lab schedule, especially field trips, may be changed.
Lecture topics are also subject to change.

Week	Lecture Topic	Chapters in Book
1	Introduction: Systems and Cycles, Hazards and Risks	1, 2
2 - 4	Soil Resources, Dynamics, and Classification: Role of Soils in Human-Dominated Ecosystems	3, 4
4 - 7	Water Resources, Water Use Patterns, Water Pollution, and Flooding: Water and its role in Human Ecosystems	6, 12, 13
8 - 10	Geologic Hazards: Slope Failure, Coastal Erosion, Earthquakes, Volcanism	5, 7, 8, 9, 10, 11
11 - 12	Solid and Hazardous Waste Management: Results and Management of Major Toxins in the Biosphere	
13 - 14	Energy Resources and associated Atmospheric Change: Acid Rain, Global Warming, Ozone Depletion	14, 15, 16
15	Planning for the Future	17

Week	Laboratory Exercise
1	Building Blocks: Significant Minerals and Rocks
2	Soil texture, structure, and profile
3	Soil classification
4	Half-day Field Trip to local stream to measure discharge and chemical parameters
5	Indices of Water Quality: Chemical Tests on River Water
6	Indices of the Physical Quality of Stream Habitat
7	Measures of Stream Hydrology and Flood Frequency
8	Half-Day Field Trip to Look at Erosion and Slope Failure
9	Slope Failure
10	Coastal Erosion
11	Half-Day Field Trip to Solid-Waste Management Site
12	Half-Day Field Trip to Hazardous-Waste Management Site
13	Airborne Pollutants: Particulate matter, Sulfur, and Ozone
14	Full-Day Field Trip to Conesville Power Plant