



Adult and Graduate Studies

BIO 111

Ecology and the Environment

Course Syllabus

Spring Semester 2021

Revised: December 25, 2020
Fall 2020 – Online
T. L. Eddy /MS, ScD

BIO 111
Ecology and the Environment

Instructor: Thomas L. Eddy

Phone: 920.295.5285

Email: teddy@marianuniversity.edu or tledddy@centurytel.net

Mode of Delivery: Online

Required Textbook:

Miller, G Tyler and Scott Spoolman. Sustaining the Earth. 2015. Cengage Learning. ISBN-10: 128576949X, ISBN-13: 978-1-285-76949-3.

Course Description:

Ecology and the Environment (3 credits) explores the organization of natural ecosystems as it relates to the human community. Basic ecological principles are applied to current environmental issues. Among the topics to be examined are past and present uses and abuses of natural resources; environmental ethics and public policy; global environmental problems; pollution; waste disposal; habitat loss; species extinction; and strategies for attaining a sustainable earth.

Prerequisite:

N/A

Course Objectives:

- Achieve proficient understanding of the basic foundation of ecology and the biological and physical components of balanced and healthy ecosystems
- Explore the interrelationships of humans and the natural world, and the causes of today's major environmental challenges
- Examine US environmental history, notably beginning in the 1950s
- Explore the cause-effect relationship of various actions/steps that could be taken to ameliorate these environmental problems
- Identify and discuss the major environmental challenges prevalent across the region
- Recognize the components to sustainability, and the role of government and business in fulfilling their social and environmental responsibilities
- Comprehend the importance of integrating environmental stewardship values into government and business

Teaching Strategies:

1. Textbook reading assignments and quizzes
2. Chapter PowerPoints
3. Online videos and paragraph summaries
4. Online activities

Evaluation Methods/Instruments:

1. Textbook Chapters and Quizzes

Read textbook chapters and take the corresponding quizzes that are accessible via [Marian Online 2](#).

IMPORTANT: Quizzes are timed. Fifteen minutes are allowed for every 10 multiple choice questions. A two-minute grace period is provided. For example, a 20-question quiz is timed for 30 minutes, plus a two-minute grace period.

2. Online videos

To access the collection of online videos you must login to [Marian Online 2](#) and access the online videos from the weekly online session.

After viewing each video, submit a brief summary paragraph that 1) identifies the guest speaker and 2) explains the gist of the speaker's message. *Be brief*

3. Online Activities

Online activities reinforce concepts and principles. Most of these activities require manipulating variables, recording data, and answering journal questions.

Checklist of written assignments:

- ☒ Seven textbook chapter quizzes
- ☒ Seven online video summaries
- ☒ Seven online activities
- ☒ One Final Exam

IMPORTANT TO REMEMBER: All assignments must be submitted no later than five days after the last class session!

Grading Criteria based on point system

A	Excellent	4.0	93-100%
A-		3.75	91-92%
B+		3.25	89-90%
B	Good	3.0	83-88%
B-		2.75	81-82%
C+		2.25	79-80%
C	Satisfactory	2.0	73-78%
C-		1.75	71-72%
D+		1.25	69-70%
D	Lowest Passing	1.0	63-68%
D-		.75	61-62%
F	Failing	0	0-60%
WD	Withdrew		
I	Incomplete		

University Policies

**For full description for Marian University policies and procedures, please refer to the Academic Bulletin or AGS Handbook.*

Academic Honesty Policy:

A policy of academic honesty is consistent with the mission statement of Marian University by ensuring academic integrity and thereby furthering the personal, moral, and intellectual development of the learning community. The intent of this policy is to establish consistency and to heighten the responsibility of the entire university community (faculty, staff and students) by identifying areas that would violate the concept of academic honesty. Little distinction is made between the student who is actually guilty of academic dishonesty and anyone who aids the student (e.g. by providing a copy of a stolen exam or by writing a paper for another student). An instructor and the University may change a student's grade at any time, even after a course has been completed, if the student has violated the Academic Honesty Policy.

The rules and procedures set forth in the current Student Handbook dealing with academic honesty will be followed in this class. Students are expected to have familiarized themselves with these rules and procedures. This applies to cheating, plagiarism, and intentional misrepresentation of the truth. If an assignment is prepared by a student for this class, it is expected that it be the student's own work and that any use of the work of another be properly quoted and cited. Penalties for violating the policy will be assigned consistent with the policy. The minimum penalty for plagiarism is a failing grade on the work in question.

Disability Statement:

Marian University will provide reasonable accommodations to qualified individuals with disabilities. If you feel you need accommodations to fully participate in this course, please contact Lisa Olig, Coordinator of Disability Services and Academic Support at 920-923-8951 or lmolig65@marianuniversity.edu.

Adult Studies - Online Attendance Policy:

As in the face-to-face environment, Marian Online classes require attendance. 'Attendance' is defined as participation in both the individual assignments and discussions. Learners who do not participate in a given learning session or who fail to complete the learning session's assignment will be 'absent' for said class period. **[You are required to *at least* logon to [Marian Online 2](#) during a weekly session to be marked as attended for that session!]**

While engaged in an online course, you will be expected to sign into the Marian Online system regularly, checking for e-mail updates, material uploads, and other course events. You will likewise be expected to respond to all class-related correspondence within 24 hours after it is posted. In extenuating circumstances, such as travel or health-related situations, more time between sign-ins may be approved; however, you will need to notify your instructor ahead of time and request approval.

Out of Classroom Workload Expectations

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five hours over the length of the course for instruction or preparation/studying or course-related activities (including lectures, laboratories, recitations, discussion groups, field work, study, and so on), averaged over the semester, in order to complete the work of the course to achieve an average grade.

This course is a 3-credit course. For every hour of in course/instructional time, a minimum of two hours of out-of-class work is expected. Additional hours are expected of graduate course work depending on the degree outcomes. According to Federal Guidelines from the US Department of Education, a 3-credit course assumes a minimum of 135 hours of course-related activities. The outside of classroom expectations of the students are as follow, for various modes of course:

- A course that meets for three hours each week across a 15-week semester (meets three times for one hour, meets two time for 75 minute session, or meets once for a three hour block) will have a minimum of six hours of outside class-work per week.

- A 7-week course that meets once a week for approximately 4 hours will have a minimum of 15 hours of outside class-work per week.
- An 8-week course that meets once a week for approximately 4 hours will have a minimum of 13 hours of outside class-work per week.
- Online and hybrid courses will have a minimum of 135 hours of combined synchronous or asynchronous course activities across the length of the course.

Academic activities include, but are not limited to reading, writing, studying, research, completing various assignments, and small group work.

At least an equivalent amount of class-related work is required for laboratory, field trip, practicum, workshop, group studio, individual studio, independent study, dissertation, clinical placements, student teaching, and practices. Courses that are more or less than 3 credits use the same calculation of in course/instructional time, a minimum of 45 hours of course-related activities per unit of credit over the duration of the course.

Classroom and Campus Expectations:

Students are encouraged to maximize the learning experience offered through Marian University. Ideal learning takes place in environments where trust, mutual respect and active engagement is valued and observed by all participants.

Students enrolled at Marian University are expected to conduct themselves in a manner appropriate to a professional setting. Students are expected to be respectful of the learning environment established by the instructor. No student has the right to be disruptive, disrespectful or uncivil in their conduct – including language – in any setting at Marian University (this includes online, Facebook, web-based venues).

A student who is deemed to be inappropriate in the classroom may be asked to leave the class for a session or longer, or may be administratively withdrawn by University officials.

Session 1

Assignments to be completed for Session One:

Read Chapter 1, Environmental Problems, Their Causes, and Sustainability

Activities:

- View PowerPoint
- Video summary
- Activity: Calculate Your Ecological Footprint
- Quiz 1, Chapter 1

Objectives

1. What are some principles of sustainability that are key to long-term sustainability of life on this planet?
2. Explain the key components of sustainability.
3. Distinguish between renewable and nonrenewable resources.
4. Distinguish between more-developed countries and less-developed countries.
5. What is environmental degradation? Give specific examples.
6. Explain and give examples of point source pollution and non-point source pollution.
7. What is the Tragedy of the Commons? Give examples of how shared resources are being degraded.
8. Explain the concept of ecological footprints. How does this model demonstrate we are living an unsustainable lifestyle? What does the role of culture play in ecological footprints?
9. Explain the five major causes of environmental problems.
10. Define *exponential population growth*. Describe the connection between exponential growth and environmental problems.
11. How does affluence impact the environment?
12. Distinguish among different environmental worldviews. How do environmental ethics contribute to decision making?
13. Explain the concept of living sustainably.
14. Why is it critical that we shift to a more sustainable lifestyle?

Session 2

Assignments to be completed for Session Two:

Read Chapters 2 & 3, Science, Matter, Energy and Systems & Biodiversity and Evolution

Activities:

- View PowerPoints
- Video summary
- Online activity: Ecology Lab (Lesson 1 – The Producers)
- Quiz 2, Chapters 2 & 3

Objectives

1. Describe the steps involved in the scientific process. Distinguish among scientific hypothesis, scientific theory, and scientific (natural) law.
2. Distinguish between tentative or frontier science, reliable science and unreliable science. Explain the importance of peer review. Explain why people often use the term *theory* incorrectly.
3. What are some limitations of science? Describe statistics and probability, and describe how they are used in science.
4. Define *matter*. Distinguish between forms of matter. Compare and contrast high-quality matter with low-quality matter and give an example of each.
5. Distinguish among a proton (p), neutron (n), and electron (e). What is the difference between the atomic number and the mass number? What is an isotope?
6. Distinguish between organic compounds and inorganic compounds.
7. What is the difference between a physical change and a chemical change?
8. What is the law of conservation of matter?
9. Define *energy*. Distinguish between forms of energy and quality of energy. Distinguish between high-quality energy and low-quality energy and give an example of each.
10. Describe how the law of conservation of matter and the law of conservation of energy govern normal physical and chemical changes. Briefly describe the second law of thermodynamics. Explain why this law means we can never recycle or reuse high-quality energy.
11. Distinguish between organism, species, population, community, ecosystem, and biosphere.

1. Explain genetic diversity and how it contributes to biological communities.
2. Distinguish between the atmosphere, troposphere, and stratosphere. Define greenhouse gases and give two examples. What is the natural greenhouse effect?
3. List four spheres that interact to sustain life on Earth. Compare the flow of matter and the flow of energy through the biosphere.
4. Distinguish between biotic and abiotic components of the biosphere and give two examples of each.
5. Define range of tolerance and the limiting factor principle. Give one example of a limiting factor in an ecosystem.
6. Distinguish between producers, consumers, and decomposers. List and distinguish between two types of producers and four types of consumers. Describe the concept of trophic levels.
7. Apply the second law of energy to food chains and pyramids of energy flow. Explain ecological efficiency.
8. Discuss the difference between *gross primary productivity* and *net primary productivity*.
9. Describe the hydrologic (water), carbon, nitrogen, or phosphorus cycle and describe how human activities are affecting each cycle.
10. List three types of rock and describe their interactions through the rock cycle.

Objectives

1. What is biodiversity, and why is it vital to sustaining life on Earth?
2. Summarize the four main facets of biodiversity.
3. Briefly describe the theory of evolution, being sure to include the roles played by variation within the gene pool and natural selection. What are the limitations to natural selection? Summarize and address three common misconceptions about evolution through natural selection.
4. What are fossils, and what information can they provide in terms of how life developed on Earth?
5. How can geologic processes, catastrophes, and climate change affect natural selection?
6. Define speciation. Explain how geographic isolation and reproductive isolation can result in speciation.
7. Distinguish between background extinction and mass extinction.
8. Explain why we should be concerned about extinction of species.
9. Describe how climate affects the distribution of plant life on Earth. Compare the climate in deserts, grasslands, forest, and mountains. Summarize the interactions of altitude, latitude, and biome type.
10. Explain how human activities are negatively impacting terrestrial biomes.
11. Evaluate the significance of the ecological contributions of the oceans. Distinguish between coastal zones and open sea. List and compare the three principal zones of an ocean.
12. Distinguish between coastal and inland wetlands. Describe the ecological functions performed by wetlands. Describe environmental problems associated with coastal and inland wetlands.
13. List and compare the four zones of a lake. Distinguish between oligotrophic and eutrophic lakes. Describe stratification and a turnover in a lake.
14. Name three different human activities that are currently threatening aquatic life zones.

Session 3

Assignment to be completed for Session Three:

Read Chapters 4 & 5, Community Ecology, Population Ecology and the Human Population & Sustaining Biodiversity: The Species Approach

Activities:

- View PowerPoints
- Video summary
- Online activity: Ecosystem Lab (Lesson 2 – Food Web)
- Quiz 3, Chapters 4 & 5

Objectives

1. Define *ecological niche*. Distinguish between a *specialist* and a *generalist*. Evaluate the conditions that favor these two approaches.
2. Explain the difference between a niche and a habitat.
3. Distinguish among the following roles played by species and give one example of each: *native species*, *nonnative species*, *indicator species*, and *keystone species*. Explain why these labels are important.
4. Why and how does resource partitioning occur?
5. Distinguish between a predator and a prey, and give an example of a predator-prey relationship. How does this relationship contribute to population management?
6. Distinguish among three forms of symbiotic relationships and give one example of each: *parasitism*, *mutualism*, and *commensalism*.
7. Define *ecological succession*. Distinguish between primary and secondary succession, giving an example of each.
8. Explain the concepts of biotic potential, intrinsic rate of increase, environmental resistance, and carrying capacity. Using these concepts, explain why there are always limits to population growth in nature.
9. Differentiate between exponential growth and logistic growth of populations.
10. Briefly explain why humans are not exempt from nature's population controls.
11. Distinguish between opportunists and competitor species. How are their reproductive rates different?
12. Define *birth rate*, *death rate*. Write an equation to mathematically describe the relationship between these rates and the rate of population change.
13. Distinguish between *replacement-level fertility* and *total fertility rate*. Describe how these fertility rates affect population growth.

14. What factors affect birth rates and fertility rates?
15. Why is infant mortality rate a key measure of a society's quality of life?
16. How does age structure impact a society? What is the impact of a rapid population decline, especially when that is focused in a single age group?
17. List the four stages of the demographic transition. List social, biological, political, and economic issues that can be addressed to help developing countries undergo a demographic transition.
18. What is the connection between a woman's birth rate and her access to education and social/economic opportunities?
19. What is family planning? Describe the roles of family planning.
20. Compare and evaluate the population policies of China and India.
21. What are the key approaches (as identified by the United Nations Conference on Population and Development) to slowing population growth?

Objectives

1. Compare past extinctions to present extinctions. Evaluate the reality of an extinction crisis.
2. Why do extinction experts consider the current estimates of species extinction to be conservative?
3. Describe the economic, medical, scientific, ecological, aesthetic, and recreational significance of wild species.
4. List and explain two reasons why some biologists caution us not to focus on protecting relatively large organisms with which we are most familiar?
5. Briefly explain what the acronym HIPPCO stands for.
6. List and briefly describe eight ways humans increase the rate of extinction, indicating which of these has the most impact.
7. Give two examples of the harmful effects of nonnative species that have been introduced both deliberately and accidentally.
8. State two examples of what can be done to decrease the incidence and impacts of invasions of nonnative species?
9. State and briefly describe the most far-reaching international treaty to protect wildlife.
10. Should the Endangered Species Act be strengthened or weakened? Defend your position.
11. Briefly assess the usefulness of wildlife refuges, gene banks, botanical gardens, and zoos in protection of wildlife. List three qualities that should be given priority in defending wildlife.
12. List and briefly describe four things that you can do as an individual to help prevent the premature extinction of species.
13. Describe how wildlife populations can be managed. Evaluate whose interests are generally the most influential in determining wildlife management priorities.

Session 4

Assignment to be completed for Session Four:

Read Chapters 6 & 7, Sustaining Biodiversity: The Ecosystem Approach & Food Production and the Environment

Activities:

- View PowerPoints
- Video summary
- Online activity: Carrying Capacity (The Lesson of the Kaibab)
- Quiz 4, Chapters 6 & 7

Objectives

1. Distinguish between old-growth forest and second-growth forest. List five reasons why forests are commercially important. List five reasons why forests are ecologically important.
2. List three ways to help reduce the interlocking problems of tropical deforestation and the fuelwood crisis.
3. State the rates of tropical deforestation. List five ways that tropical forests touch lives in the temperate zones. List three factors underlying causes of tropical deforestation. List eight human activities that actually destroy the tropical forests. List five ways that tropical deforestation could be reduced.
4. Describe the advantages and disadvantages of clear-cutting a forest ecosystem.
5. Describe the natural capital of forests in terms of ecological and economic services.
6. Describe the steps in forest management. List and summarize the goals for three types of tree harvesting.
7. Define and describe at least seven characteristics of sustainable forestry.
8. Briefly describe the extent of national parks worldwide. Describe a major problem of national parks. State three steps that could improve the national park system. Evaluate the wolf controversy, take a stand, and defend it.
9. Define wilderness. Describe a biosphere reserve. State one problem of wilderness areas and describe how that problem could be managed better.
10. Compare the status of U.S. forests from 1900 and the present. Summarize how U.S. forests are currently managed. List ways environmentalists recommend to reform federal forest management, including: (a) two changes in resource-use practices, (b) three economic strategies, and (c) three political strategies.
11. What is a biodiversity hotspot? Give three supporting reasons why it is important to protect such areas.
12. Define and give three examples of ecological restoration.
13. Summarize ways to globally manage marine fisheries to prevent over fishing.
14. Define the importance of aquatic biodiversity and describe three ways to protect and sustain marine biodiversity.
15. Define the importance of aquatic biodiversity and describe three ways to protect and sustain freshwater biodiversity.
16. Describe three ways that freshwater ecosystems are threatened.

17. List and briefly explain four of the priorities for protecting most of the world's remaining ecosystems as proposed by Edward O. Wilson.

Objectives

1. Explain why *poverty* is regarded as the root cause of hunger.
2. Define *food security* and *food insecurity*. How do they differ from nation to nation?
3. Distinguish among *malnutrition*, *undernutrition*, and *overnutrition*. Indicate how many people on the earth suffer from these problems and where these problems are most likely to occur.
4. Describe the harmful effects of diet deficiencies in vitamin A, iron, and iodine.
5. Compare traditional and industrialized agriculture. Distinguish among industrialized (high-input) agriculture, plantation agriculture, traditional subsistence agriculture, traditional intensive agriculture, polyculture, and slash-and-burn agriculture.
6. Define soil and the major layers in mature soils. How does soil contribute to each of the four components of biodiversity?
7. Describe and evaluate the green revolution.
8. Distinguish between artificial selection and genetic engineering (gene splicing).
9. What are genetically modified organisms (GMOs or transgenic organisms)? Explain the advantages and disadvantages of genetically engineered foods.
10. Compare industrial fishing and aquaculture.
11. Describe the trends in total world fish catch since 1950 and explain what can be ascertained from the data.
12. Describe the problems of salinization and waterlogging of soils and how they can be controlled.
13. Describe the problem of soil erosion. Describe both world and U.S. soil erosion situations. Give an explanation for the ignorance about this problem.
14. Describe the advantages and disadvantages of using genetically modified crops and foods. Which two advantages and which two disadvantages do you think are the most important? Why?
15. List the five major classes of pesticides and what they are used to treat.
16. Give five benefits for using pesticides.
17. Describe five consequences of relying too heavily on pesticide use.
18. List five ways you could reduce your exposure to pesticides.
19. List and briefly describe seven alternative pest management strategies. Describe and evaluate *integrated pest management*.
20. Compare conventional-tillage and conservation-tillage farming. List and briefly describe six strategies to prevent soil erosion.
21. List six ways to maintain soil fertility. Describe at least one advantage of using organic instead of inorganic fertilizer.
22. List the advantages and disadvantages of aquaculture and describe six ways that the process can become more sustainable.
23. Explain why a shift to consuming more grain-efficient forms of animal protein is a more sustainable form of meat production.
15. Describe sustainable agriculture. List at least three steps that could be taken to move the United States toward more sustainable agriculture.

Session 5

Assignment to be completed for Session Five:

Read Chapters 8-9, Water Resources and Water Pollution & Nonrenewable Energy Resources

Activities:

- View PowerPoints
- Video Summary
- Online Activity: Wisconsin's Groundwater: Basic concepts and information resources
- Quiz 5, Chapters 8-9

Objectives

1. Briefly describe the earth's water supply and its distribution. How does water flow through the hydrologic cycle? How does human activity interfere with the hydrologic cycle?
2. How much of the world's reliable runoff do we use? What impact will be predicted population increases have on our water use? Describe two areas in the world with significant water scarcity.
3. Briefly describe three major water problems. Evaluate which of these problems is of most concern in the United States and in the region in which you live.
4. Evaluate increasing the water supply through use of dams and water transfer projects. Compare the advantages and disadvantages of increasing the water supply through use of groundwater, desalination, and water transfer.
5. State how much water is wasted. Briefly describe measures that can be taken to reduce water losses through irrigation, industry, and home use.
6. What is one significant change you can make to conserve water?
7. What would be the impact of increasing the cost of water on water usage?
8. What are the factors that have led to flooding disasters in Bangladesh? Describe ways to mitigate flood risks. What inherent risks are present in those approaches to flood control?
9. Water pollution, caused mostly by agricultural activities, industrial facilities, and mining, and worsened by growth in population and resource use, causes illness and death in humans and other species, and disrupts ecosystems.

- List eight common types of water pollutants and give an example of each. Distinguish between point and nonpoint sources of pollution.
- Draw an oxygen sag curve to illustrate what happens to dissolved oxygen levels in streams below points where degradable oxygen-demanding wastes are added.
- Compare problems of lake water pollution to those of stream pollution. List three ways to prevent cultural eutrophication and three ways to clean up cultural eutrophication. Summarize the state of the Great Lakes.
- List the major pollutants of groundwater and three ways to control groundwater pollution.
- Summarize ways to purify drinking water.
- Compare freshwater pollution to ocean pollution. List three ways to protect coastal waters.
- Briefly describe two major laws that protect water quality in the United States. Outline the arguments for and against strengthening the Clean Water Act.
- Briefly describe and distinguish among septic tanks, primary, secondary, and advanced sewage treatment. Describe biologist John Todd's approach to sewage treatment.

Objectives

- With what criteria should energy resources be evaluated?
- What is the significance of the concept of net energy?
- What are several products we obtain from refining crude oil?
- Why is petroleum useful as an energy resource? What are the disadvantages?
- Distinguish between shale oil and tar sands. Despite their large worldwide reserves, these are not good choices for supplying the world's oil. Why?
- Distinguish between natural gas, liquefied petroleum gas, and liquefied natural gas.
- List the advantages and disadvantages of using natural gas as an energy source.
- Evaluate the usefulness of coal as an energy source.
- What are the advantages of nuclear power?
- What are the challenges associated with using nuclear power? Be sure to consider all parts of the nuclear fuel cycle.
- What are important considerations in predicting the future of nuclear power?

Session 6

Assignment to be completed for Session Six:

Read Chapters 10-11, Energy Efficiency and Renewable Energy & Environmental Hazards and Human Health

Activities:

- View PowerPoints
- Video Summary
- Online activity: Calculate Your Carbon Footprint
- Quiz 6, Chapters 10-11

Objectives

- Explain why we can think of energy efficiency as an energy resource.
- Define *cogeneration* and describe its potential for saving energy.
- Describe changes that can be made in industry, transportation, buildings, lights, and appliances that would improve energy efficiency.
- List the advantages and disadvantages of using direct solar energy to heat buildings and water and to produce electricity.
- Briefly describe a photovoltaic cell. Describe its usefulness and limitations in converting sunlight to electricity.
- List the advantages and disadvantages of using water in the forms of hydropower, tidal power, and wave power to produce electricity.
- What are the arguments for and against installing wind farms?
- What factors have contributed to the widespread use of wind power in Europe?
- List the advantages and disadvantages of using biomass to heat space and water, produce electricity, and propel vehicles. Consider burning wood, agricultural wastes, and urban wastes as well as conversion of biomass to biofuels.
- What are the positive and negative impacts of Brazil's extensive use of sugar cane-derived ethanol?
- Evaluate the usefulness of geothermal energy in providing space heating, high-temperature heat, and electricity.
- List the advantages and disadvantages of using hydrogen gas to heat space and water, produce electricity, and propel vehicles.
- What energy sources are needed to produce hydrogen in truly sustainable manner?
- Summarize constraints to a solar-hydrogen revolution.
- List the eight key questions that must be asked about each energy alternative to evaluate energy resources.
- Analyze the interactions of economic policy and energy resources. In particular, consider the results of using free-market competition, keeping energy prices low, and keeping energy prices high.

Objectives

- Define risk, probability, and risk assessment. List five general types of common hazards and give two examples of each.
- Transmissible diseases can be spread from one person to another. List two factors that contribute to the spread of infectious diseases.
- Tuberculosis is a significant infectious disease problem. List several reasons that fighting TB infections is especially difficult.

4. The global HIV/AIDS pandemic has caused significant death around the world, especially in Sub-Saharan Africa. List three impacts of the AIDS epidemic on communities in Sub-Saharan Africa.
5. List three approaches to preventing malaria.
6. Define *mutagen*, *teratogen*, and *carcinogen*. Summarize current research implying chemical effects on the immune, nervous, and endocrine systems.
7. Chemical hazards, for example, are defined by their toxicity, the person's acute and chronic reactions to it, and its pervasiveness in the environment.
8. Toxicity estimates are based on case reports and epidemiological studies; animal testing can also be used to estimate toxicity.
9. Define *dose* and *response*. Distinguish among acute, chronic, and subchronic exposures. Distinguish among acute and chronic effects. Summarize three methods used to enhance our understanding of toxicity of chemicals.
10. Define a *dose-response curve*. Distinguish between a linear dose-response model and a threshold dose-response model. Describe the difficulty in deciding which model applies best when low doses are involved. Assess the limits of toxicological research.
11. Summarize key questions to be answered in risk-benefit analysis, risk assessment, and risk management. What are the useful applications and limits of these analyses?
12. List five factors that can cause people to perceive that a technology or product has a greater risk than the risk estimated by experts.

Session 7

Assignment to be completed for Session Seven:

Read Chapters 12, 13 & 14 Air Pollution, Climate Change and Ozone Depletion; Urbanization and Solid and Hazardous Waste; Economics, Politics, Worldviews and Sustainability

Activities:

- View PowerPoints
- Video summary
- Online activities: AirNow: Get air quality where you live; *The Man Who Planted Trees*
- Quiz 7, Chapters 12, 13 & 14

Objectives

1. Distinguish between the earth's troposphere and stratosphere.
2. Distinguish between weather and climate. List seven factors that influence climate.
3. Describe the greenhouse effect and what the earth would be like without a greenhouse effect.
4. Define *air pollution*. Distinguish between a primary pollutant and a secondary pollutant.
5. Distinguish between photochemical smog and industrial smog. Describe a thermal inversion.
6. Define *acid deposition*. Briefly describe how acid deposition can affect buildings, vegetation, soil, aquatic organisms, and humans.
7. List the four most dangerous indoor air pollutants. Briefly describe how the body tries to protect itself from damage caused by air pollution. What are some of the consequences of prolonged or acute exposure to air pollution?
8. Briefly describe the EPA's outdoor air pollution control strategies. Describe in detail the 1990 strategy to reduce sulfur dioxide emissions. List five policies that would strengthen the Clean Air Act.
9. List five ways to reduce indoor air pollution. Describe strategies to implement an integrated approach to protecting the atmosphere.
10. Describe the pattern of Earth's average surface temperature fluctuation of geologic time.
11. Summarize scientific consensus about future global warming. What evidence supports the role of human activity in contributing to climate change?
12. Summarize current signs and projected effects of climate change: drought, melting ice and snow, melting permafrost, rising sea levels, extreme weather events, threats to biodiversity, threats to agriculture, and threats to human health.
13. Name and briefly describe two basic approaches to potential global warming. Describe three ways to slow global warming. List three ways to adapt to global warming.
14. What could the role of governments be in responding to climate change?
15. Summarize and assess the controversy over formation of the ozone hole. Explain the causes and potential effects of stratospheric ozone changes. Propose three ways for slowing these changes.
16. Compare the priorities of high-waste, recycling, and low-waste approaches to solid waste management. List priorities for a low-waste approach as established by the U.S. National Academy of Sciences. Evaluate which approach makes the most sense to you. Give reasons for your choice.
17. Evaluate incineration as an approach to dealing with solid waste.
18. Summarize difficulties with land disposal of hazardous wastes. Name and briefly describe two U.S. hazardous-waste laws. Describe how the Superfund could be improved.
19. Describe bioremediation and its potential for dealing with hazardous waste in the future.

Objectives

1. Define urbanization and urban growth. Describe the four major trends in the problems and challenges of urban growth. List the advantages and disadvantages of urbanization.
2. Discuss how automobiles encourage urban sprawl and the pollution effects. Weigh the trade-offs in reducing automobile use in favor of alternative transportation methods.

3. Discuss strategies for developing urban areas with minimal ecological impact. Give an example of an ecocity and describe how they work.
4. Distinguish between solid waste and municipal solid waste. Indicate how much of the solid waste in the U.S. comes from municipal solid waste. What are the challenges related to e-waste?
5. List six ways to reduce waste and pollution. Describe the most ecological approaches to dealing with refillable containers and grocery bags.
6. Define *sanitary landfill*. Describe three problems associated with landfills. Evaluate sanitary landfills as an approach to dealing with solid waste.
7. Distinguish between closed-loop recycling and open-loop recycling. Compare centralized recycling with source separation. Briefly describe recycling of aluminum, wastepaper, and plastics in the United States. List three obstacles to recycling in the United States and suggest ways to overcome them.

Objectives

1. Distinguish between the following: *natural capital*, *manufactured capital*, and *human capital*. Distinguish between the *neoclassical economist view* and the *ecological economists view* on the importance of natural capital.
2. Define *gross domestic product* (GDP). Evaluate the commonly held belief that GDP is an indicator of a country's wellbeing. Describe alternative indicators that take social and environmental factors into account. Evaluate the accuracy of these indicators.
3. Define *external costs*. Give examples of external costs and external benefits that might be involved in purchasing a car. Define *full-cost pricing*.
4. List six political tools that can be used to improve environmental quality and reduce resource waste. List advantages and disadvantages of each tool. Evaluate which tool you think is best. Be prepared to defend your choice.
5. Predict likely consequences for a society whose goal is zero pollution.
6. Define *poverty*. Describe the trickle-down theory. Evaluate its effectiveness in decreasing poverty levels. Describe several strategies that can help to reduce poverty.
7. List five ways to move toward a more ecologically sustainable economy
8. List three types of environmental leadership. Compare mainstream and grassroots environmental groups.
9. Summarize the goals and tactics of the anti-environmental movement.
10. Discuss how environmental security is linked to military and environmental security.
11. List three problems with and solutions for dealing with international environmental treaties.
12. List four basic beliefs common to planetary management worldviews. List and contrast four schools of thought within the planetary management worldview.
13. Distinguish *human-centered worldviews* and *earth-centered worldviews*. List the beliefs of one earth-centered worldview. Summarize environmental ethical guidelines regarding the relationship of humans to ecosystems, species, human cultures, and individual responsibility.
14. Summarize the goals of environmental literacy. Discuss strategies for bring about a sustainable revolution during your lifetime.