



COURSE OUTLINE

Course Number BIO114	Course Title Environmental Science Concepts	Credits 3
Hours: 3 hours Online Course	Co- or Pre-requisite: ENG 024 or equivalent proficiency	Implementation: Summer 2015

Catalog description (2015-2016 Catalog): This course is a survey of fundamental concepts of environmental science focusing on the environment and aquatic and terrestrial ecosystems. Topics include the biological and chemical principles that relate to current environmental issues, conservation of plants and animals, energy flow as well as nutrient cycling, basic ecological and technological concerns and advances, and scientific analysis and solutions to environmental problems. This is a non-laboratory course.

Is course New, Revised, or Modified? Revised to include classroom-based and online course formats.

Required texts/other materials: *Visualizing Environmental Science*, 4th Edition, Wiley, 2014, ISBN 978-1-118-16983-4

Revision date: 06/2015 **Course coordinator:** Renee Nerish, Ext. 3373, nerishr@mccc.edu

Information resources: Blackboard learning management system with Wiley's Online Resource Kit (with textbook): PowerPoint presentations, Environmental Science videos, Interactivities, Animations, Case Study, and Flashcards.

Other learning resources: Environmental Science Research Paper using MCCC Library online databases for academic resources.

Course Competencies/Goals:

Upon completing the course, the student will be able to:

- Identify and discuss technological, biological, and chemical developments (past and present) that have impacted the environment, positively and negatively.
- Analyze the complexities of environmental issues in our daily lives, including political and ethical concerns and sociological consequences.
- Assess current causes, current status, alternatives and consequences of alternative solutions to environmental problems.
- Promote environmental awareness and citizen involvement in the preservation of the environment, both now and in the future.

Course-specific General Education Knowledge Goals and Core Skills.

General Education Knowledge Goals

- **Goal 1. Communication.** Students will communicate effectively in both speech and writing.
- **Goal 3. Science.** Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
- **Goal 4. Technology.** Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
- **Goal 5. Social Science.** Students will use social science theories and concepts to analyze human behavior and social and political institutions and to act as responsible citizens.
- **Goal 8. Diversity.** Students will understand the importance of a global perspective and culturally diverse peoples.

MCCC Core Skills

- **Goal A. Written and Oral Communication in English.** Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.
- **Goal B. Critical Thinking and Problem-solving.** Students will use critical thinking and problem solving skills in analyzing information.
- **Goal C. Ethical Decision-Making.** Students will recognize, analyze and assess ethical issues and situations.
- **Goal D. Information Literacy.** Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
- **Goal E. Computer Literacy.** Students will use computers to access, analyze or present information, solve problems, and communicate with others.
- **Goal F. Collaboration and Cooperation.** Students will develop the interpersonal skills required for effective performance in group situations.
- **Goal G. Intra-Cultural and Inter-Cultural Responsibility.** Students will demonstrate an awareness of the responsibilities of intelligent citizenship in a diverse and pluralistic society, and will demonstrate cultural, global, and environmental awareness.

Units of Study in Detail.

Unit 1: Environmental Challenges, Sustainability, and Human Values

At the end of this unit, students will be able to:

1. Distinguish among highly developed countries, moderately developed countries, and less developed countries.
(Course Competencies 1,3; Gen Ed Goal 1, 5; Core Skills A, B, E)
2. Distinguish between people overpopulation and consumption population.
(Course Competencies 1,3 ; Gen Ed Goal 1, 5, 8; Core Skills A, B, E, F)
3. Describe the three factors that are most important in determining human impact on the environment. Identify human behaviors that threaten environmental sustainability.
(Course Competencies 3,4; Gen Ed Goal 1,5 ; Core Skills A, B, E, F)

4. Identify human behaviors that threaten environmental sustainability.
(Course Competencies 3,4; Core Skills A, B, E, F)
5. Identify some of the complexities associated with the concept of sustainable consumption.
(Course Competencies 3,4; Gen Ed Goal 1,8 ; Core Skills A, B, C, F)
6. Relate poverty and population growth to carrying capacity and global sustainability.
(Course Competencies 4; Gen Ed Goal 1, 5 ; Core Skills A, B, C, F)

Unit 2: Ecosystems

At the end of this unit, students will be able to:

1. Identify ecological levels to include: population, community, ecosystems, landscape, and biosphere.
(Course Competencies 1; Gen Ed Goal 1, 5, 8; Core Skills A, B, E, F)
2. Distinguish the states of energy, producers, consumers, and decomposition as well as energy flow through a food web.
(Course Competencies 1 ; Gen Ed Goal 1, 5, 8; Core Skills A, B, E, F)
3. Identify the cycling of matter in ecosystems: carbon, hydrologic, nitrogen, sulfur, and phosphorus cycles.
(Course Competencies 1; Gen Ed Goal 1,5, 8; Core Skills A, B, E, F)
4. Identify factors contributing to an organism's biological niche and resource partitioning.
(Course Competencies 1,3; Gen Ed Goal 1,5, 8 ; Core Skills A, B, E, F)
5. Distinguish all interactions among organisms, relationships among organisms, competition and keystone species.
(Course Competencies 1,3; Gen Ed Goal 1, 5, 8 ; Core Skills A, B, F)
6. Identify the major terrestrial biomes and characteristic organisms and climate.
(Course Competencies 1; Gen Ed Goal 1, 5, 8 ; Core Skills A, B)
7. Identify environmental factors that affect aquatic ecosystem including environmental characteristics of each.
(Course Competencies 1,3; Gen Ed Goal 1, 5, 8 ; Core Skills A, B, F)

Unit 3: Population, Risk, and Hazardous Waste

At the end of this unit, students will be able to:

1. Distinguish human population: size, biotic potential, history, carrying capacity.
(Course Competencies 1-4; Gen. Ed. Goals: 1, 3, 4, 5, 8; Core Skills A, B, C, E, F, G)
2. Interpret Thomas Malthus's ideas and describe problems associated with urbanization and rapid population growth.
(Course Competencies: 1-4; Gen. Ed. Goals: 1, 3, 4, 5; Core Skills: A, B, C, F, G)
3. Identify risk to include: health threats and effects of pollutants and their effects on humans.
(Course Competencies: 1, 3, 4; Gen. Ed. Goals: 1, 3, 5; Core Skills: A, B, C, E, F)
4. Distinguish between solid wastes and their methods of disposal as well as reduction methods.
(Course Competencies: 1-4; Gen. Ed. Goals: 1, 4, 5; Core Skills: A, B, C, F)
5. Examine reduction methods of solid waste and identify hazardous wastes and their management.
(Course Competencies: 1-4; Gen. Ed. Goals: 1 & 5; Core Skills: A, B, C, E, G, F)

Unit 4: Air Pollution and Atmospheric Changes

At the end of this unit, students will be able to:

1. Differentiate the layers of the atmosphere, gases in the atmosphere and the *Coriolis Effect*.
(Course Competencies 1 & 3; Gen. Ed. Goals: 1 & 3; Core Skills A, B, F)
2. Distinguish the major classes of air pollutants; including their characteristics and sources as well as adverse effects, develop ways to control outdoor air pollutants.
(Course Competencies: 1-4; Gen. Ed. Goals: 1, 3, 5, 8; Core Skills: A, B, C, F, G)
3. Describe indoor pollution: sources and effects on developing countries.
(Course Competencies: 1, 3, 4; Gen. Ed. Goals: 1, 3, 5, 8; Core Skills: A, B, F, G)
4. Distinguish between weather and climate, solar energy, and regional precipitation.
(Course Competencies: 1 & 2; Gen. Ed. Goals: 1 & 3; Core Skills: A, B, F)
5. Identify greenhouse gases and evaluate their effect on climate change and mitigation of global climate change.
(Course Competencies: 1-4; Gen. Ed. Goals: 1, 3, 4, 5; Core Skills: A, B, C, F, G)
6. Identify and describe ozone depletion in the stratosphere and acid deposition.
(Course Competencies: 1, 2, 3; Gen. Ed. Goals: 1, 3, 4; Core Skills: A, B, C, F, G)

Unit 5: Water, Agriculture and Energy

At the end of this unit, students will be able to:

1. Describe the hydrologic cycle, structure and properties of water.
(Course Competencies 1; Gen. Ed. Goals: 1 & 3; Core Skills A & F)
2. Identify water resource problems and describe water pollution: eutrophication, BOD, groundwater pollution giving examples of each.
(Course Competencies: 1-4; Gen. Ed. Goals: 1, 3, 4, 5, 8; Core Skills: A, B, F, G)
3. Describe sustainable water use: dams, reservoirs, and water concentration in agriculture.
(Course Competencies: 1-4; Gen. Ed. Goals: 1, 3, 5, 8; Core Skills: A, B, F)
4. Evaluate ways of improving water.
(Course Competencies: 1 - 4; Gen. Ed. Goals: 1, 3, 5, 8; Core Skills: A, B, C, E, F, G)
5. Distinguish the principal types of agriculture, challenges of agriculture, evaluate solutions to agricultural problems and controlling agricultural pests as well as identifying and comparing world food problems.
(Course Competencies: 1-4; Gen. Ed. Goals: 1, 3, 5, 8; Core Skills: A, B, C, E, F, G)
6. Describe direct solar power: advantages and disadvantages of solar energy relating to conversion of solar electric energy, how fuel cell work, indirect solar energy including: biomass, wind energy, and hydropower, as well as distinguish between geothermal and tidal energy.
(Course Competencies: 1 - 4; Gen. Ed. Goals: 1, 3, 4, 5, 8; Core Skills: A, B, E, F)

Evaluation of Student Learning:

Opinion Papers (5, in-class) OR Discussion Boards (12)	40%
Unit Tests (5)	40%
Environmental Science Research Paper	20%
Environmental Topic:	2%
Position Statement and Annotated Bibliography	5%
Environmental Science Research Paper	13%
TOTAL	100%

SUGGESTED COURSE SCHEDULE (*Subject to Change*)

Please Note: The textbook Chapter readings are from *Visualizing Environmental Science*, 4th Edition, Wiley, 2014. Both the in-class *and* online delivery formats are incorporated into the schedule.

Weeks*	Unit	Chapter*	Assignments
Weeks 1 & 2	1	1	Textbook reading PowerPoint (PPT) presentation Current media, online activities & media (online) Calculate Your Footprint assignment Online discussion board
	1	2	Textbook reading PPT presentation Current media, online activities & media Online discussion board Unit 1 Test
Week 2			Environmental Research Paper is assigned.
Weeks 3 & 4	2	5	Research Paper Topic (Stage 1) is due Textbook reading PPT presentation Current media, activities & media Online discussion board
	2	6	Textbook reading PPT presentation Current media, online activities & media Discussion board (online) Unit 2 Test
Weeks 5, 6, 7 & 8	3	7	Research Paper Position Statement with Annotated Bibliography (Stage 2) is due Textbook reading PPT presentation Current media, online activities & media Discussion board (online)
	3	4	Textbook Reading PPT Presentation Current media, online activities & media Discussion board (online)

Weeks*	Unit	Chapter*	Assignments
	3	16	Textbook reading PPT presentation Current media, online activities & media Discussion board (online) Case study ('High-Tech Waste') Discussion board (online) Unit 3 Test
Weeks 9, 10, & 11	4	8	Textbook reading PPT presentation Current media, online activities & media Discussion board (online)
	4	9	Textbook reading PPT presentation Current media, online activities & media Discussion board (online) Unit 4 Test Final Research Paper (Stage 3) is due
Weeks 12, 13, 14, & 15	5	10	Textbook reading PPT presentation Current media, online activities & media Discussion board (online)
	5	14	Textbook reading PPT presentation Current media, online activities & media Discussion board (online)
	5	18	Textbook reading PPT presentation Current media, online activities & media Discussion board (online) Unit 5 Test

Discussion Board grades will be based on the Discussion Board Scoring Rubric.

Discussion Board Scoring Rubric

Criteria	D (mid) 65 Points	C (mid) 75 Points	B (mid) 85 Points	A (mid) 95 Points	Total
Ideas, Content, & Analysis	Ideas expressed are not original, lack depth, and/or may be confusing to follow. Little or no connections to readings, others' postings, and/or real-life. Little or no discussion of student's opinion with examples or reasons. Short statements such as "I agree with...".	Ideas expressed are not necessarily original, reflective, or substantive; little connections made to readings, others' postings, and/or real-life experiences; rehashes or summarizes other postings or text from readings.	Ideas expressed are somewhat original in thought, substantive, and reflective; some connections made to readings, others' postings, and/or real-life experiences. Some evidence of insight or analysis with examples or reasons.	Ideas expressed include original thought, substantial depth, and reflection with references to readings and/or relevancy to writing topic. Strong evidence of insight or analysis; construction of new meaning. Connections are made to readings, others' postings, and/or real-life experiences. Full discussion of student's opinion with examples and reasons.	/100
Timeliness	Some required postings missing by deadline &/or there was not adequate time for others to read and respond to postings prior to deadline.	All required postings by deadline; however there was not adequate time for others to read and respond to some postings prior to deadline.	All required postings by deadline (required=1 posting + 2 replies to classmates); adequate time for others to read and respond prior to deadline.	Exceeds required postings; postings are early into the discussion and throughout the discussion; provides more than enough time for classmates to read and respond prior to deadline.	/100
Writing Quality	Posts show a below average/poor writing style in terms of appropriate standard English writing style, clarity, language used, and grammar.	Posts show an average and/or casual writing style with some errors in spelling, grammar, punctuation, and usage.	Posts show above average writing style using standard English with little grammar, punctuation, and spelling errors.	Posts are well written and clear using standard English, characterized by elements of a strong writing style and basically free from grammar, punctuation, and spelling errors.	/100
TOTAL POINTS (Average of 3 Criteria)					/100
Note: F=0 for Discussion Board assignment not completed by deadline					

Academic Integrity Statement:

Mercer County Community College is committed to Academic Integrity – the honest, fair and continuing pursuit of knowledge, free from fraud or deception. This implies that students are expected to be responsible for their own work and that faculty and academic support services staff members will take reasonable precautions to prevent the opportunity for academic dishonesty. The college recognizes the following general categories of violations of Academic Integrity, with representative examples of each. Academic Integrity is violated whenever a student:

A. Uses or obtains unauthorized assistance in any academic work.

- copying from another student's exam.
- using notes, books, electronic devices or other aids of any kind during an exam when prohibited.
- stealing an exam or possessing a stolen copy of an exam.

B. Gives fraudulent assistance to another student.

- completing a graded academic activity or taking an exam for someone else.
- giving answers to or sharing answers with another student before, during or after an exam or other graded academic activity.
- sharing answers during an exam by using a system of signals.

C. Knowingly represents the work of others as his/her own, or represents previously completed academic work as current.

- submitting a paper or other academic work for credit which includes words, ideas, data or creative work of others without acknowledging the source.
- using another author's words without enclosing them in quotation marks, without paraphrasing them or without citing the source appropriately.
- presenting another individual's work as one's own.
- submitting the same paper or academic assignment to another class without the permission of the instructor.
- falsifying bibliographic entries.
- submitting any academic assignment which contains falsified or fabricated data or results.

D. Inappropriately or unethically uses technological means to gain academic advantage.

- Inappropriately or unethically acquiring material via the Internet or by any other means using any electronic or hidden devices for communication during an exam.

BIO 114 Environmental Science Research Paper Guidelines

Students are required to prepare a typed Research Paper on a topic in Environmental Science from a list of approved topics (see end of document). The report must be a minimum of **6 pages double-spaced**. The topics must be related to Environmental Science and submitted for approval to the instructor by the third week of class. Only ONE topic may be selected per student.

The final paper must make a statement relating to your position on an Environmental Science topic and must be defended with evidence from research sources that support your claim.

Examples of positions:

- The One-Child Plan (Law) in China is working.
- The increase in sea water temperature is destroying coral reefs.
- Wind energy will not work in all states in the United States of America.

Topics can include a subject area of your choosing that relates to Environmental Science from the approved list (**see topics at end**). The research paper will be completed in stages throughout the semester as follows:

- Your **Research Topic** must be submitted to the instructor by **Week 3**.
- Your **Position Statement (thesis) and Annotated Bibliography** must be submitted to the instructor by **Week 5**.
- Your **Final Paper** is including documented resources due by **Week 10**.

All papers should be typed using **Word** (.doc or .docx file format). The material used in the paper **must** include reputable academic sources. Utilize a **MINIMUM of 4 academic sources** following **APA guidelines**.

The following **online databases** through the MCCC library (http://www.mccc.edu/student_library_online.shtml) are recommended for locating *academic sources* that are relevant to your research topic:

- GreenFILE
- ProQuest Science Journals
- Science Reference Center
- Academic Search Premier (EBSCO Host)
- ProQuest Central
- JSTOR

Note: DO NOT use your textbook as a source or emphasize information that can be found in it. Internet sources and sites must be academic in nature (scientific not commercial) and listed exactly so that the information can be verified. Do not cut and paste from the Internet and expect to get a passing grade.

Plagiarism will be reported to the academic standards committee and result in failing this course. The final paper will be checked to be sure the required length is met (total word count) and required number of sources (in-text citations and References Page) following APA guidelines.

Your Research Paper will be graded based on the **Environmental Research Paper Scoring Rubric**.

Environmental Science Research Paper Scoring Rubric

Criteria	D (mid) 65 Points	C (mid) 75 Points	B (mid) 85 Points	A (mid) 95 Points	Total
Position Statement	Position Statement needs to be developed further and/or is unclear, and/or missing from the paper; focal point is not maintained throughout the paper.	Position statement is somewhat unclear and needs to be developed further to clearly state student's position on the selected environmental science topic and/or focus was not sufficiently maintained throughout the paper.	Developed a position statement that states student's position on the selected environmental science topic and was primarily the focal point of the paper.	Well-developed position statement that clearly states student's position on the selected environmental science topic and is the focal point of the paper.	/100
Depth and Evidence (Sources)	Position is not supported with the required number of sources (4) and/or the sources are not academic in nature. Information is not necessarily relevant and/or does not support the position statement from a scientific perspective.	Position is not supported with the required number of sources (4) and/or some sources are not academic in nature. Information is partially relevant and/or supports position statement from a scientific and non-scientific perspective.	Position is supported with the required number of academic sources (4). Information is mostly relevant and supports position statement from a scientific perspective.	Position is supported in-depth with at least 4 academic sources. Information is highly relevant and supports position statement from a scientific perspective.	/100
Timeliness and Length	Paper completed and submitted three to seven days after the deadline.	Paper completed and submitted two days after the deadline.	Paper completed and submitted one day after the deadline.	Paper completed and submitted by deadline.	/100
Writing Quality & Adherence to Guidelines	Paper shows a below average/poor writing style in terms of APA Guidelines and appropriate standard English, , clarity, language used, and/or grammar.; and/or frequent formatting errors and/or paper is less than 3 pages.	Paper shows an average and/or casual writing style in terms of APA Guidelines, with some errors in spelling, grammar, punctuation, and/or usage. Paper may have APA errors in formatting and/or is under 5 pages in length.	Paper shows above average writing style using APA Guidelines and standard English with little grammar, punctuation, and/or spelling errors and/or little formatting errors or paper is under 6 pages in length.	Paper is well written and clear using APA Guidelines and standard English characterized by elements of a strong writing style and basically free from grammar, punctuation, and/or spelling errors. Paper meets format and length of paper requirements (6 pages).	/100
TOTAL (average of criteria)					/100
Note: F=0 for Discussion Board assignments not completed by deadline					

ENVIRONMENTAL SCIENCE CONCEPTS

BIO 114

Research Paper Topic Examples

Please remember that you must form an opinion about the topic you choose and defend that position in your paper. For example you may say that “The One Child Plan (Law) in China is working because the population in China has decreased.” You must then defend that position and back that statement up with facts. All facts must be sourced utilizing APA guidelines.

1. Acid Deposition
2. Aquaculture
3. Biological Magnification
4. Carbon Management
5. Clean Air Act
6. Cycling of Matter in the Ecosystem (specific cycle(s))
7. Drinking water regulations and testing (bottled water)
8. Ecosystem Services
9. Energy Conservation
10. Environmental Ethics
11. Environmental Justice
12. Environmental Sustainability
13. Evolution
14. Genetic Engineering
15. Genetically Modified Foods
16. Green Revolution
17. Greenhouse Effects (Enhanced Greenhouse Effects)
18. Integrated Pest Management
19. Interactions Among Organisms
20. Irrigation
21. Lung Disease and Smoking
22. Magnuson-Stevens Fishery Conservation and Management Act
23. Marine Pollution
24. Natural Selection
25. NOAA: National Oceanic and Atmospheric Administration (programs)
26. Nonrenewable Resources
27. One Child Plan (Law)
28. Ozone Thinning
29. Pesticides and Genetic Resistance
30. POPs (Persistent Organic Pollutants)
31. Population Ecology
32. Precautionary Principle Selection
33. Primary and Secondary Air Pollutants
34. Rapid Increase in World Population
35. Renewable Resources
36. Safe Drinking Water Act
37. Salinization
38. Sick Building Syndrome
39. Solar Heating: Active and Passive
40. Sustainable Agriculture
41. Sustainable Consumption
42. UNCLOS: U.N. Convention on the Law of the Seas
43. Water Pollution (be specific, i.e. municipal water, fresh water, bottled water, etc.)
44. Zero Population Growth