

ENV 1511 E
Conceptual Integrated Science and the Environment
Spring 2014, Block 2
Ketner 203

Instructor: James K. Stringfield, Ph.D.

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Office hours: MWF 8:30-11:30; T 3:00-4:30; other hours by appointment. (Please note that supervision of student teachers and professional duties may alter office hours.)

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Assigned readings: Handouts are posted on Blackboard, along with additional readings from online resources. There are no required textbooks or instructional resources to purchase.

American Association for the Advancement of Science (1989) *Science for All Americans*
Accessible online at <http://www.project2061.org/publications/sfaa/online/sfaatoc.htm> (free)

Ball, David W. (2011) *Introductory Chemistry*, v. 1.0. Saylor Foundation. Available for free download at <https://open.umn.edu/opentextbooks/BookDetail.aspx?bookId=22>

Brown, Lester R. (2009) *Plan B 4.0 Mobilizing to Save Civilization*. W.W. Norton and Company.
http://www.earthpolicy.org/images/uploads/book_files/pb4book.pdf (free download)

Crowell, Benjamin (2006) *Conceptual Physics*
http://www.lightandmatter.com/html_books/7cp/ch01/ch01.html

Kimball, John W. (2010) *Kimball's Biology Pages* (free, online biology textbook).
<http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/>

Course Description

This three-credit course provides an overview of integrated science. It is designed to provide individuals with a conceptual understanding of the integrated nature of science. A focus is placed on understanding the major theories and concepts that unify the sciences as seen through the lens of environmental science.

Natural Science Learning Outcomes for General Education

This course is designed to help students meet the learning outcomes for General Education distribution requirements in natural science for graduation from Catawba College. These learning outcomes are:

- Students will demonstrate an understanding of the scientific method within a disciplinary context.

- Students will collect, analyze, and interpret data.
- Students will demonstrate an understanding of the impact of scientific knowledge on the world.

The instructor will retain copies of student work in order to document student competence in meeting the goals and objectives of general education. The following chart illustrates how each goal will be assessed:

Goal	Methods of assessment
Students will demonstrate an understanding of the scientific method within a disciplinary context.	Multiple choice and short answer questions on quizzes and final exam. Essay question on final examination.
Students will collect, analyze, and interpret data.	Data analysis activities (exponential growth lab, pendulum labs 1,2, and mass spring lab)
Students will demonstrate an understanding of the impact of scientific knowledge on the world.	Multiple choice and short answer questions on quizzes and final exam. Essay question on final examination. Research paper

Course Aim

The student will develop a general understanding of integrated science.

Course Goals

Each student will

1. Develop a qualitative understanding of the major unifying concepts, principles and processes of science.
2. Develop an understanding of the relationships among the sciences (in order to see connections among scientific concepts).
3. Apply scientific knowledge for a deeper understanding of societal issues, including environmental problems.

Course Objectives

Each student will be able to-

1. Name, identify, and briefly describe major concepts of science as outlined in works such as *Science for All Americans*, *National Science Education Standards*, and the *North Carolina Standard Course of Study: Science*.
2. Explain the science behind some everyday phenomena.
3. Explain science concepts to others, including children, in an intellectually honest manner.
4. Answer questions that children often ask about the natural world in terms children can understand while being able to answer the same types of questions at a level appropriate for college students enrolled in an introductory non-majors course.
5. Describe connections between environmental science and the biological, physical, and earth/space sciences.
6. Conduct simple scientific investigations
7. Safely perform demonstrations and conduct activities that illustrate concepts of integrated science.

8. Evaluate environmental issues in light of knowledge of principles, processes, and concepts of science.

Course Policies and Requirements

Grading policy. Your grade will be based upon the following:

Quizzes	40%
Final Exam	20%
Daily Grade (In-class assignments)	10%
Data Analysis Activities	10%
Research paper	10%
Presentation (or second paper)	10%

Component	Percentage	Points
Quizzes	40%	400
Final Exam	20%	200
Daily grade (in-class assignments)	10%	100
Data analysis activities	10%	100 (4 activities, 25 each)
Research Paper	10%	100
Presentation or Second Paper	10%	100
Total	100%	1000

Grading Scale (points)

940-1000	A	770-790	C+	600-630	D-
900-930	A-	740-760	C	<600	F
870-890	B+	700-730	C-		
840-860	B	670-690	D+		
800-830	B-	640-660	D		

Note: Your final grade is determined by the total amount of points you earned. You may calculate your grade at any time by taking the points you earned and dividing by the maximum number of points you could have earned; multiply this number by 100 to give a percentage. All grades will be posted on Blackboard.

Quizzes. There will be five quizzes. Each quiz will be administered at the beginning of class; thirty minutes will be allocated for the administration of each quiz, with a five minute break scheduled immediately after the quiz. The quizzes include multiple choice, fill in the blank, and short answer questions. The lowest quiz grade is dropped, and the remaining quiz grades are averaged to be 40% of the class grade; therefore, each of the four quizzes is worth 10% of your final grade. Except for cases of verifiable and unavoidable emergencies, illness, or inclement weather, missed quizzes cannot be made up.

Final Exam. The final exam is comprehensive, covering material from the first evening of class. It follows the same format as the quizzes.

Class assignments/Daily grade

1. The daily grade is based on your participation in class, including participation in hands-on activities and class discussions, notes from videos, or worksheets. If you are not present for class, then you will receive a grade of zero for that day's work; if you are present for half the class, then you will receive a grade of fifty for that day's work if you complete the work that was assigned. At the end of the course, the daily grades will be averaged to give you a class assignment grade that is worth 10% of your final course grade. The lowest daily grade is not dropped; however, students are not penalized for missing class due to inclement weather.
2. All work must be completed on time. Most assignments may be completed in class, but if you are working the entire period and unable to complete an assignment you may submit it at the beginning of the next period.
3. Due to the large amount of time required for the instructor to prepare laboratories, make-up work for laboratory type activities is usually not permitted.

Data Analysis Activities

You will be expected to complete four activities in which you collect and analyze data. The first is an exponential growth lab that will be completed on the first night of class. Instructions for the next three activities (pendulum lab 1, pendulum lab 2, and mass/spring lab) are posted on Blackboard and will be discussed on the second night of class. The three activities are online simulations that you may complete by yourself or with another partner. The Saturday class session has been designated as an "online" session, and the three labs are due not later than 5 pm that day. However, students are certainly free to work ahead and submit their work before that date.

Research paper

You will be expected to write a short research paper on a science related topic. The paper will also address the impact of scientific knowledge on the world. Details are presented in a handout posted on Blackboard.

Presentation You will present one demonstration or hands-on activity to the class. If you prefer not to make a presentation you may write a short paper. Details are presented on a separate handout.

Attendance Policy

Your prompt and regular attendance at each class is expected and appreciated. We only have nine classes (and the last class is the final examination), so attendance at each class is essential if you are to learn the material and be successful. Missing one class, or even part of one class, can put you behind very quickly.

The instructor reserves the right to fail any student who misses more than 1/4 of the classes (more than 2 ½ classes). Failure to attend more than one half of a class counts as one class absence.

Make-up work/ late work

As a general rule, no make-up work is permitted and late work is not accepted. Make up tests

and quizzes are provided for students who provide legitimate reasons (“extenuating circumstances”) such as illness or family emergency and who, upon request, are able to provide documentation regarding the cause of their absence. Make-up tests and quizzes cover the same content as regularly scheduled tests, but contain different questions than regularly scheduled tests. Make-up tests must be completed no later than one week upon return of the student to class.

Inclement weather

Classes will be held in accordance with the College’s inclement weather policy; if the College is open, then we will have class. However, if there is snow or ice on the roads you need to use your own professional judgment as to whether it is safe for you to travel or if you need to leave class early.

Student File Folders

At the beginning of the term you will be given a file folder that you will write your name on. As you enter class each period you are expected to pick up your folder as it contains any handouts for the day as well as any papers that are to be returned to you. You are expected to place any assignments (homework or laboratories) into your folder. When you return your folder make certain that you return to its rightful place (the folders are in alphabetical order). The folders are designed to be an efficient way for us to exchange papers, as well as for the instructor to quickly take attendance. Although you are welcome to store your work in the folders, they were not designed for that purpose (for example, you should be taking your homework back with you to read and study) and the instructor assumes no responsibility for papers left in the folders after the day papers are returned.

Academic honesty

Students are to adhere to the Academic Expectation policies and Honor Code as outlined in the *Catawba College Catalog*.

Students are expected to take quizzes and the final examination on their own, without any reference to materials, resources, or people except as approved by the instructor. Cell phones, calculators, and other electronic devices must be put away during quizzes and the final examination.

Students are encouraged to work together on laboratory assignments (as directed in class). Students may wish to form cooperative study groups in which they hold one another accountable for learning the material. However, each student is responsible for submitting his or her own work. Copying another person’s work, or allowing another student to copy one’s work, is a form of academic dishonesty (cheating).

Academic dishonesty can lead to severe consequences, including failure in this class, referral to a campus honor court, and/or dismissal from the College.

Date	Topic	Readings and Assignments
2/13 Th	Course Introduction Nature of Integrated Science Population growth Exponential Growth Lab (Data Analysis Activity 1)	Handout: Nature of Science (placed on Blackboard) <i>Science for All Americans</i> , Chapter One: The Nature of Science Suggested reading: Kimball, search “human population growth”
2/17 M	Quiz 1 <u>Physics</u> Motion Newton’s Laws of Motion Universal Gravitation Energy and Energy Transfer Preview: Data Analysis Activities	Handout: Motion (placed on Blackboard) Handout: Gravitation (placed on Blackboard) Energy, Work, and Food Chains (Blackboard handout) <i>Science for All Americans</i> , Chapter Four: The Physical Setting Suggested reading: Newton’s Laws http://www.physicsclassroom.com/class/newtlaws/
2/20 Th	Quiz 2 <u>Physics</u> Heat and heat transfer Waves Sound Light	Heat (Blackboard handout) Basic Concepts of Sound (Blackboard handout) Basic Concepts of Light (Blackboard handout) Last night to sign up for a presentation/paper topic
2/24 M	Quiz 3 Electricity and Magnetism Environmental Chemistry Water Air Presentations begin	Handout: Basic Concepts of Electricity and Magnetism (placed on Blackboard) Basic Concepts of Chemistry (Blackboard handout) Water (Blackboard handout) Air (Blackboard handout) Suggested: Ball, Chapter one: What is Chemistry?
2/27 Th	Quiz 4 <u>Biology</u> Nature of Life Ecology Population Biology Genetics Presentations	Nature of Life (Blackboard handout) Ecology (Blackboard handout) Kimball, search “food chains,” “biomes” <i>Science for All Americans</i> , Chapter Five: The Living Environment Population Biology (Blackboard handout) Kimball, search “checks on population growth”

		Genetics (Blackboard handout)
3/1 S	<u>Data Analysis Activities 2-4</u> Pendulum Lab 1 Pendulum Lab 2 Mass Spring Lab (online class)	Note: Today's class is an online session. Three assignments are due by 5 pm today and should be submitted via Blackboard.
3/3 M	Quiz 5 Evolution <u>Earth Science</u> Plate tectonics Volcanism, mountain building, Earthquakes Rocks and Minerals: the Rock Cycle Presentations	Evolution: quick guide (Blackboard handout) Handout: Plate Tectonics (placed on Blackboard) Handout: Gravitation (placed on Blackboard) Handout: Rocks and minerals (rock cycle) <i>Science for All Americans</i> , Chapter Ten: Historical Perspectives: Moving the Continents Suggested reading: Plate tectonics http://www.learninggeoscience.net/free/00040/index.htm
3/6 Th	<u>Earth Science</u> Weather and Climate Change Environmental issues (Plan B Discussion) Earth's Place in the Universe Presentations Research Paper Due (be prepared to briefly discuss your paper with the class)	Handout: Weather and Climate Suggested reading: Plan B Chapters 1-3, 5 Handout: Astronomy <i>Science for All Americans</i> , Chapter Ten: Historical Perspectives: Displacing the Earth from the Center for the Universe, Uniting the Heavens and the Earth
3/10 M	Final Examination	