Natural World

Gustavus Adolphus College
CUR 260 - Fall 2009

Instructor: Dr. Charles F. Niederriter
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Books:

1. (AOS) *The Ascent of Science*, by Brian Silver, Oxford, 1998
2. (TWW) *The World's Water 2008-2009: The Biennial Report on Freshwater Resources,* by Peter Gleick, Island Press, 2008
3. (WSR) *Water: A Shared Responsibilty (United Nations World Water Development Report),* World Water Assessment Program, UNESCO, 2006
4. (SLU) *Our Search for Life in the Universe,* by Chris Impey, Random House, 2007
5. *Star and Planet Locator*, from Edmund Scientific

Course Objectives

1. To understand how we know what we know.
2. To understand how science shapes culture, language and public policy—both historically and contemporarily.
3. To understand what is life: the theory of evolution, the mechanisms of genetics, and the emergence of the complexity of the mind.
4. To ask the question: Can all knowledge be unified by the natural sciences?
5. Numeracy (How to use and interpret numbers, tables, and graphs)
6. Basic Physical Concepts
7. What did it take to have life appear on the Earth. Are we alone in the universe?

Course Policy and Evaluation

1. **Objectives:** Since this may be the only science course the student will have at Gustavus, it will include a broad overview of science, including astronomy, biology, chemistry, geology, and physics. There will be a focus on this year's Nobel Conference topic, *The Earliest Humans,* and astronomy and cosmology. Necessarily, there will be a little bit of mathematics involved, as well.

2. **Class Meetings and Reading Assignments**: The class will meet five days a week (M-F) for discussion, labs, group problem solving, homework review, lecture, quizzes, and exams. Students are expected to have read the assigned materials **before** coming to class. Occasionally I will provide a few questions to guide your reading. You will be required to bring your answers (typed is preferred) to class on the day the material will be discussed.

3. **Attendance:** Regular attendance at all classes and participation is expected. Students are responsible for informing themselves of all announcements and assignments made in the classroom. Arrive at class on time - excessive tardiness may be reflected by a reduction of the final course grade.

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4. **Homework**: Problems will be assigned occasionally. Problems will be graded and returned to the student. Homework should be neat and orderly. Each student will submit their own assignment, but you may discuss problems with each other. Late homework will be accepted at the discretion of the instructor with some loss of points.

5. **Group Problems**: Frequently in class, students will work together, in assigned groups of 3-4 members, to cooperatively solve problems. A group solution will be submitted, with all group members receiving the same grade. There will be no make-up for group problems missed due to absence. These activities will not be scheduled and may be used to test students' knowledge of old material or to introduce new material.

6. **Presentations:** During the course, at several times during the semester there will be individual or group presentations. You will have at least 3 class days of advanced notice before any formal presentations.

7. **Labs and Projects:** Periodically students will work in groups to perform lab experiments or work on other projects. A report will be turned in by the group and, in some cases, the group will present their work to the entire class.

8. **Participation:** An important component of this course is group discussion. The participation component of the grade will be based on attendance and regular participation in group discussions. NOTE: There are a variety of ways that one can participate in group discussions - these include contributing information, summarizing discussion (in both written and verbal form), acting as "devils advocate," brainstorming, and being a group leader. You should try to take on all of these roles at various times during the semester.

9. **Reading Journal (RJ):** It is a good idea to take notes or highlight while reading books that contain a good deal of information to help with comprehension. Occasionally reading journals will be checked or students will be asked to share an excerpt from their notes or highlighted material.

10. **Quizzes:** Occasionally there will be a short quiz on recent material. Some of these will be individual problems and some will be in small groups.

11. **Exams:** There will be four one-hour exams and a two-hour final exam. The hour exams will include short answer and multiple choice questions, and longer essay, and computational problems.

12. **Missed Exams:** Students are expected to arrange with the instructor *in advance* to take an exam at other than the announced time. Permission to make up a missed exam after the fact will be at the discretion of the instructor and should not be assumed.

13. **Side Trails:** If you think of our reading as being a trail we are walking along, there are many interesting side trails branching off from it. Often those side trails are marked by notes or supplementary items in the text, though some may become apparent to you from the text itself.

There may be recent development related to the reading, which constitutes a side trail the author couldn't possibly have noted. Side trails can be a lot of fun to explore; this course gives you the opportunity to discover that. Periodically we will list side trails and assign groups or individuals to scout them out.

14. **Office Hours, etc.:** My scheduled office hours are 1st hour every day. I will make every effort to be available during these times for individual assistance and advising. I will also be available at other times by appointment. In general, if you want to stop in and you see me in the office, feel free to ask for help. If I can't help you then, I'll suggest some later time. Don't be afraid to ask for help.

15. **Disability Services:** Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (1990) work together to ensure "reasonable accommodation" and non-discrimination for students with disabilities in higher education. A student who has a physical, psychiatric/emotional, medical, learning, or attentional disability that may have an effect on the student's ability to complete assigned course work should contact the Disability Services Coordinator in the Advising Center (x6286). No accommodations can be made without review by the Disability Services Coordinator.

16. **Academic Honesty**: The instructor is bound to abide by the College's Honesty Policy and therefore must report all incidents of academic dishonesty (cheating, copying, etc.) to the Dean's Office. In the spring of 2003, the College adopted an academic honesty policy and honor code system, which is printed in the Academic Bulletin and in the Gustavus Guide. All students will be required to abide by the policy and write the following honor code on every examination and graded assignment:

"On my honor, I pledge that I have not given, received, nor tolerated others' use of unauthorized aid in completing this work."

Not all components of this course are subject to the Honor Code. The instructor will clearly identify to which items the Code applies. But the student is responsible for requesting clarification if necessary.

17. **Evaluation**:

Exams & Quizzes	40%	A	94 - 100	C+	74 - 78
Final Exam	10%	A-	90 - 94	C	70 - 74
Homework	10%	B+	86 - 90	C-	66 - 70
Labs and Projects	20%	B	82 - 86	D+	62 - 66
Quizzes	10%	B-	78 - 82	D	58 - 62
Participation and In-Class Group Work	10%	F	< 58		

Assignment of final letter grades will also take into account the instructor's subjective evaluation of the student's attendance, initiative, class participation, preparation (particularly quantity and quality of homework), and evidence of improvement.

18. **Incompletes**: A grade of incomplete will be given only for work not completed due to circumstances beyond the control of the student.

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19. **Course Schedule**

Week Beginning	Topic	Assigned Reading
September 7	What is Science?	AOS Part 1
September 14	Ionian Enchantment to the Enlightenment	AOS Part 2 & WSR Section 1
September 21	Water, A Shared Responsibility Living in a Changing World	TWW 1-6
September 28	Changing Natural Systems	WSR Section 2
October 5	Nobel Conference, H_2O: Uncertain Resource	WSR Section 3
October 6	******* Nobel Conference - No Class ******	
October 13	****** Exam 1 on AOS Parts 1&2, WSR 1-3, & TWW 1-5 *****	
October 12	Challenges for Well-being and Development Water Management Issues	TWW Water Briefs & WSR Sections 4 & 5
October 19	The Ascent of "Modern" Science & Motion, Waves, Energy, Entropy, & Chaos	AOS Parts 3, 4, 5, & 6
October 26	Quantum Mechanics and Modern Physics	AOS Parts 7
October 26 - 27	***** **Reading Days (Fall Break) ********	
November 2	Relativity and Cosmology	AOS Parts 8
November 9	Science, Technology, and the Future	AOS Parts 9 & 10
November 16	The Unfinished Revolution (Astronomy)	SLU 1 & 2
November 19	****** Exam 2 on TWW Water Briefs, WSR 4 & 5, and AOS Parts 3-10 *****	
November 23	Life's Origins	SLU 3
Nov. 26 - 30	***** **Thanksgiving Break ********	
November 30	How Special is the Earth?	SLU 4 & 5
December 7	Are We Alone in the Universe?	SLU 6 & 7
December 11	***** Exam 3 on Chapters 13 - 18 *****	
December 14	Presentations and Review	

December 19 10:30 PM * Final Exam - Comprehensive *****