

## Environmental Toxicology

**Instructor:** Lawrence K. Duffy, 246 WRRB, [lkduffy@alaska.edu](mailto:lkduffy@alaska.edu), 474-7525

**Office Hours:** Tuesday and Thursday following lectures. However students are encouraged to contact the instructor by phone or email at any time

**Lecture:** Tuesdays and Thursdays, 11:30 am – 1:00 pm. Murie 103

**Textbook:** Fundamentals of Ecotoxicology 4<sup>th</sup> Edition (ISBN 978-14-666-58-2293) by Michael C Newman, CRC Press, Taylor and Francis Group. No supplementary reading required for purchase. Primary literature will be provided by instructor.

**Course Description:** This 3 credit course will discuss the basic components of environmental and ecotoxicology, and explores exposure of toxic chemicals to animals and plants and their impact on health and the ecosystem, using a One Health model. Environmental Toxicology will focus on the general properties and principles of persistent and/or toxic chemicals commonly encountered in air, water, fish and wildlife. Numerous natural and synthetic chemicals in the environment will be discussed from a global perspective with some bias towards arctic and subarctic regions. This toxicology course combines aspects of environmental science, vertebrate biochemistry and physiology and environmental chemistry in a manner to understand how systems are impacted and function.

### Student Learning Outcomes:

- increase understanding of biochemistry with respect to environmental contaminants
- increase understanding of the chemical-biotic interactions
- gain an understanding of how biota alters the structure and dynamics of contaminants in the diverse ecosystems of the North

### Course Goals:

This course will provide the basic foundations for Environmental Toxicology  
 The class will focus on specific aspects of Environmental Toxicology that interest the student  
 Develop an appreciation of the complex system of contaminant interactions in high latitude systems

### Instructional Methods:

The teaching methods employed in this course will consist of lectures and “chalk talk” by the instructor. It is absolutely crucial that reading (see schedule) of sections is done in advance. Student essays and presentations on specific topics will also be used.

### Grading:

Exams: There will be four term exams (50 points each); one for each major section of the course.  
 Oral class participation in the form of discussions will be included in the final grade (100 points). This entails an active involvement into the regular lecture materials discussed. Quiz/Class participation (100 points).

### Undergraduate Students

Exams	200 points (4 exams 50 points each)
O assignments	200 points (Presentation)
Discussions	200 points (Discussions: 50 points per discussion package)
Undergraduate total	600 points (400 points O 66%)

**Exams:**

Four examinations that will focus on the three major sections

Each exam is 50 points (4\*50 points = 200 points for exams) and will be multiple choice, true or false, and/or short essay format.

**Orals:**

The oral presentations (O, 15 minutes each = 10 points to present + 5 minutes for questions) will count as 100 or 200 points each. Each student will have 2 O assignments (mandated by the university for full O and full W). Topics must be presented to the instructor for approval. During oral presentations we will have the entire class present and invite other students and faculty with the expectation to have > than 12 members in the audience (minimum of 5). Part of the grade for students will be participation during the Q and A session; they must be engaged for credit. Presentations must have a clear "introduction-body-conclusion" organization, appropriate to Environmental Toxicology and all will include visual aids. All presentations will receive evaluation by the instructor on oral communication including responsiveness to audience questions and subject mastery.

**Course Policies**

**Attendance:** Regular student attendance is expected to ensure consistent group activities and discussions.

**Exams:** 4 exams will be given. These exams will be a combination of multiple choice/short answer and essay questions (take home or in class). Makeup exams will only be allowed with pre-approval of the instructor or with an acceptable, documented reason such as unexpected illness, family emergencies or other unavoidable events.

**Participation:** Class participation entails an active interest aside from paper discussion/presentations. This includes but is not limited to answering questions during lectures, asking for clarifications, or contributing to ad hoc discussions.

**Ethical Considerations:** The Chemistry "Department Policy on Cheating" is as follows: *"Any student caught cheating will be assigned a course grade of F. The student's academic advisor will be notified of this failing grade and the student will not be allowed to drop the course."*

**Plagiarism Policy**

Plagiarism is defined as the use of "other" intellectual property without proper reference to the original author. Intellectual property includes all electronic (Internet), spoken or print media. Students are expected to cite all sources used in oral and written presentations. Cases of plagiarism will be taken seriously with a grade 0 for the particular assignment. Severe cases may be referred to the Department Chair or Dean or class failing considered.

**Support Services**

Support services will be provided by the University of Alaska Library system, online resources and the instructor. Additional services are available through Student Support Services (<http://www.uaf.edu/sssp/>) at UAF.

**Disabilities Services**

Students with a physical or learning disability are required to identify themselves to Mary Matthews in the Office of Disabilities Services (203 WHIT, 474-7043) located in the Center for Health and Counseling in order to receive special accommodations. The student must provide documentation of the disability. Disability Services will then notify me of special arrangements for taking tests, working homework assignments, and doing lab work.

See academic calendar on UAF website for important university dates. <http://catalog.uaf.edu/calendar/calendar17-18/>

## Language for Syllabi

University of Alaska Board of Regents have clearly stated in BOR Policy that discrimination, harassment and violence will not be tolerated on any campus of the University of Alaska. If you believe you are experiencing discrimination or any form of harassment including sexual harassment/misconduct/assault, you are encouraged to report that behavior. If you report to a faculty member or any university employee, they must notify the UAF Title IX Coordinator about the basic facts of the incident. Your choices for reporting include:

- 1) You may access confidential counseling by contacting the UAF Health & Counseling Center at 474-7043;
- 2) You may access support and file a Title IX report by contacting the UAF Title IX Coordinator at 474-6600;
- 3) You may file a criminal complaint by contacting the University Police Department at 474-7721.

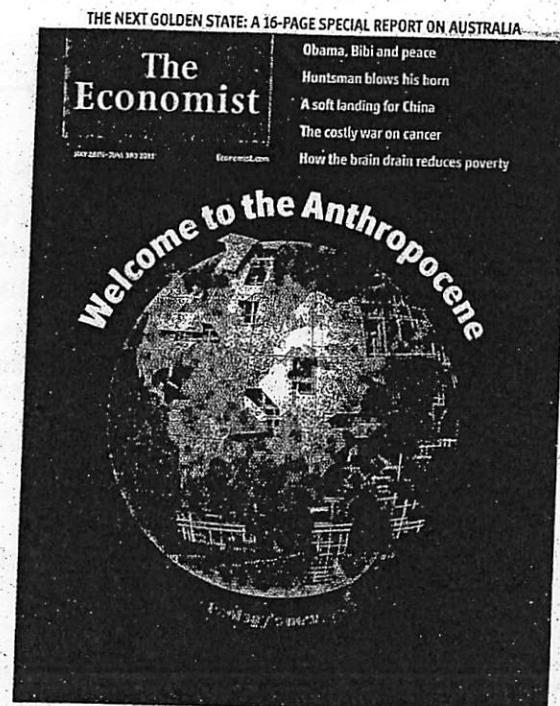
## EARTH SCIENCES

## We Need a Deeper Sense of Time

Scott L. Wing

For almost 500 years, science has been relentlessly removing humans from a privileged place in time and space. Copernicus put the Sun at the center of the solar system. Hutton inferred that Earth was ancient, and Holmes estimated its age at 4.5 billion years. Darwin revealed that we are, like every other species, descended from earlier life forms. Increasing scientific knowledge has seemed to lead almost inevitably to the view that we are just a blip—one among millions of species, occupying a few recent moments of Earth history. Although science will never place humanity back at the center of creation, the accumulation of findings from several fields has shown that we no longer play a bit part on the planet.

The role of humans on the global stage is the theme of Curt Stager's *Deep Future*. Stager (a paleoecologist at Paul Smith's College, New York) begins by welcoming readers to the Age of Humans (Anthropocene). He immediately follows with words that will discomfit many traditional conservationists: "Welcome to the end of the natural world as a realm that is somehow meaningfully distinct from humanity." The remainder of the prologue makes the book's argument clear: human effects on the



**Cover story.** The 28 May 2011 issue of the *Economist* spotlighted "humans as a geological force to be reckoned with."

globe are pervasive, the processes we are changing are slow, and thus understanding our own impact requires a long temporal perspective. Even those who study global change commonly take 2100 CE as the outer temporal limit for their projections, failing to realize that human effects are, as Stager puts it, "so large, powerful, and long-lived that they cannot be fully understood from a mere century-scale point of view."

Through the book's 11 chapters, Stager explains many of the basic processes that affect climate, such as orbital oscillations, ocean circulation, and the carbon cycle. Maintaining a casual style and providing vivid metaphors, he makes his account entertaining and easy for nontechnical readers to understand. Along the way, he focuses on important examples of past climate change, such as the Eemian interglacial 130,000 years ago and the "super greenhouse" Paleocene-Eocene Thermal Maximum (PETM) of 56 million years ago. Although I found a few small points to quibble with in the chapter on the PETM (my specialty), Stager shines in making these episodes from climate history relevant to the future by comparing them to moderate and extreme scenarios for anthropogenic global warming.

The chapter on Greenland presents Stager's most compelling story of the deep future.

Relying on simulations of the effects of high partial pressure of carbon dioxide by Richard Alley, Jeff Ridley, and others, Stager lays out the development of Greenland's landscape and economy as its ice cap melts. He even playfully proposes a name, Ny Fjord (New Fjord), for the giant tongue of ocean that could come to occupy central Greenland by 5000 CE. He envisions a thriving Arctic-fishing industry lining the shores of the 400-m-deep fjord, then explains how the fjord would (to the shock of most nongeologists) empty over the succeeding 50,000 years as isostatic rebound following deglaciation raises the crust of central Greenland. This example demonstrates that a lot of drama can be found in linking results from long-term models to a specific landscape and imagining how people would fit into that world to come.

The deep future will never be as salient as tomorrow, nor should it be. Nonetheless, the consequences of anthropogenic environmental change are so large and play out so slowly that the really long-term perspective must be considered. Stager argues that a mature perspective on the global environment cannot find escape in the apocalypse, in false hope of a return to some pre-human state, nor in cynical resignation that short-term benefits will trump all long-term costs. We lack the capacity to "destroy the planet" as it is sometimes formulated but also the ability to return it to a "state of nature," if such a state implies no human influence. The Earth sciences community has been very focused on improving our ability to predict, but now we must help develop and spread the habits of mind and society that will allow people to use our predictions.

Books such as *Deep Future*, along with recent articles on the Anthropocene in the *New York Times*, the *Economist*, and *National Geographic*, offer hopeful signs that a truly long-term perspective is spreading to lay audiences. Perhaps residents of the later Anthropocene will look back and see the early 21st century as the time when humanity's perspective on itself changed again—when we realized that our descendants will live in the world we knowingly shape. Our outsized influence entails a responsibility to figure out not just how our planet works but also how to pragmatically use that knowledge to improve our future.

**Deep Future**  
The Next 100,000 Years  
of Life on Earth  
by Curt Stager  
Thomas Dunne Books,  
New York, 2011. 300 pp.  
\$25.99. ISBN 9780312614621.

The reviewer is at the Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20013-7162, USA. E-mail: wings@si.edu

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