

**ESP 001: Environmental Analysis
Course Outline and Schedule**

Instructors:

Prof. Gwen Arnold (gbarnold@ucdavis.edu). Phone (530) 752-6718.

Office hour: Thursday 9:00-9:50am, 2135 Wickson Hall (lab room used specifically for ESP1 office hour; at other times, go to Wickson 2144).

Prof. Marcel Holyoak (maholyoak@ucdavis.edu). Phone (530) 867-3391.

Office hour: Tuesday 10:00-10:50am, 3154 Wickson Hall (office, for everything)

TAs: Kat Powelson (KP: kwpowelson@ucdavis.edu).

Office hour: Tuesday 11:10am-12:00pm, Wickson 2110C

Kate Tiedeman (KT: kmtiedeman@ucdavis.edu)

Office hour: Wednesday 3:10-4:00pm, Wickson 2135

Matt Hamilton (MH: mhamilton@ucdavis.edu).

Office hour: Tuesday 12:10-1:00pm, Wickson 2128

If you cannot make office hours, send us an email and we will arrange another time to meet.

Class meeting dates, times, and place:

Lectures	Tuesday and Thursday	7:30 to 8:50 am	3 Kleiber Hall
Discussion Sections	Tuesday (KP)	12:10-1:00 pm	Kerr 293
	Tuesday (MH)	1:10-2:00 pm	Wickson 2124
	Tuesday (MH)	2:10-3:00 pm	Wellman 115
	Tuesday (MH)	3:10-4:00 pm	Wellman 229
	Tuesday (MH)	4:10-5:00 pm	Wellman 229
	Wednesday (KP)	9:00-9:50 am	Storer 1344
	Wednesday (KP)	10:00-10:50 am	Wickson 2124
	Wednesday (KP)	11:00-11:50 am	Wickson 2124
	Wednesday (KP)	12:10-1:00 pm	Kerr 293
	Wednesday (KT)	1:10-2:00 pm	Kerr 293
	Wednesday (KT)	2:10-3:00 pm	Wickson 2124

Initials correspond to TAs. KP = Kat Powell, KT = Kate Tiedeman, and MH = Matt Hamilton.

Course objectives: To provide students with: (1) Knowledge of environmental and natural resource policies and management. (2) The scientific basis for policies and the role of science in the policy-making process. (3) Awareness of contemporary debates and issues in environmental science and public policy. (4) A balanced and objective perspective and

appreciation of the technical, political, economic, and legal issues associated with the making of environmental policy at federal, state, and local levels.

The overall structure of the course is:

- Part 1: Introductory material on environmental science and policy design, implementation, and assessment
- Part 2: Biodiversity conservation and Endangered Species Act
- Part 3: Water resources and management
- Part 4: Managing natural resources in a changing climate

Course web page and mailing list: Log onto <http://smartsite.ucdavis.edu> for downloading course materials and links to useful references. You will need a Kerberos (UC-Davis) username and password to access the site. Please also opt-in for receiving announcements, as we will use the announcement tool in Smartsite to notify you of additional supplementary reading materials, changes in the schedule, and other course related news.

Grade breakdown: Grades will be determined according to:

- active participation in discussion groups (15%)
- homework assignments (10% for first, 15% for second)
- completion of 4 out of 5 of the in-class activities (10% total)
- midterm exam (25%)
- final exam (25%)

Each assignment will be out of 100 points.

Format of assignments and exams:

- Both the midterm and final exam will consist of a mix of short answer (requiring answers of up to a few sentences), fill-in-the-blank, and multiple choice questions. We will provide example questions as study guides. Exams will be written on the exam papers and paper provided by the TAs/instructors. No blue book or Scantron forms are needed. An English language translation device (or dictionary) that serves the sole purpose of translation may also be used in exams if it is preapproved by one of the professors. (Students interested in using this option should check with Profs. Arnold or Holyoak at least one week before the exam.) It is also permissible to ask the meaning of words in exam questions by raising your hand during exams.
- The homework assignments: You will submit two papers, each 750 words or less. For each, you will explain an environmental policy problem/issue, noting important uncertainties and/or gaps in scientific knowledge. You will present technical and policy solutions that could be applied to the problem/issue and evaluate their strengths and weaknesses. You will highlight questions that scientists and/or policy actors must address to make progress on the problem/issue. The first paper will be worth 10% of your homework assignment grade and the second paper will be worth 15%. You will receive a separate handout with additional details about the assignments.
- Five in-class activities will be offered and you must complete at least four of them to receive any points. Each is worth 2.5% of the course grade. No points will be awarded

unless you complete four activities. Completion of all five activities does not result in more than 10% of the course grade.

Readings: There are two types of readings: required readings for discussion sections and optional readings that provide background for the lecture material. There is no book for this course because no single text adequately covers the material. Instead, we provide the optional readings to supplement lecture material; note that these do not replicate lectures but rather provide a second resource for understanding relevant concepts. All readings are available on Smartsite in the Resources folder. We will announce in lectures, discussion section, and on Smartsite any changes to the readings. Please allow yourself time to study the readings and look ahead in the syllabus so that you know what is expected for upcoming lectures and discussions.

Lectures and lecture materials: You are expected to attend lectures. We will not always make summary notes or Powerpoint slides available on Smartsite. Furthermore, the critical information may not be readily discernable from slides. If you miss a lecture, we highly recommend that you get notes from a classmate and listen to the podcast.

Discussions:

The discussion grade will break down as follows:

- 20% for attendance
- 50% for informed participation
- 30% for performance on in-class assignments

Active and informed participation in discussions is required. “Active” means that on average you talk for 2-3 minutes per discussion section. “Informed” means that you have read the assigned materials and thought about them.

If you cannot attend a discussion session in a particular week, you should attend a different section that week; this is on a space-available basis and you need to make arrangements with your TA as soon as possible. If you cannot attend a different section, you may be able to write a one-page summary of the readings in order to earn points for attendance and participation for that week. You must tell your TA in advance that you want to pursue this option and explain why. If the reason is acceptable (i.e., your absence is due to an unavoidable event or commitment), your TA will indicate the deadline by which you must submit this summary and provide you with additional instructions.

Important dates:

- First written assignment due on Oct. 20 in class
- Midterm: Oct. 27 in class
 - Midterm review sessions: To be announced
- Second written assignment due on Nov. 24 in class
- Final exam: Dec. 9, 10:30am-12:30pm, 3 Kleiber Hall
 - Final review session: Dec. 3 in class

Academic conduct: We all agree to uphold the University Code of Academic Conduct, which is available at <http://sja.ucdavis.edu/cac.html>. Any violations will be reported to Student Judicial Affairs.

Your assignments must be independent pieces of work written by you. We encourage having friends and classmates proofread your work, but you must turn in independently written work that does not copy the wording of another student, a website, or any other source. Avoiding plagiarism means not only avoiding identical wording, but also avoiding very similar statements with only a few words changed. This requires restructuring an idea in your own words and citing sources. If using original wording is unavoidable, then use quotations and cite the source. For a very informative set of examples, see <http://sja.ucdavis.edu/files/plagiarism.pdf>.

Assignment policies: *The written assignments are due at the beginning of class on the specified day as hard copies.* If you cannot attend class due to illness, then you can turn in assignments by getting a hard copy to either of the envelopes posted outside Profs. Arnold's and Holyoak's office doors (2144 and 3154 Wickson, respectively) by the due date and time. Please print double-sided.

Late assignments will be deducted 10 points for each 24-hour period after the due date and time (all assignments are out of 100 points). After three 24-hour periods, you will be assigned a zero unless a documented reason is accepted by us. Please note that a missing assignment can have a significant impact on your grade. Each written assignment is worth at least a full grade (10-15% of the total), so missing one could mean the difference between a B and C, for example. If you are turning in a late assignment during a 24-hour period that falls on a weekend, then email a scanned or typed copy to us to establish the turn-in time **and** bring the hard copy to one of the envelopes outside one of the professors' offices the following Monday. If you have a doctor or other official note, please be sure that it specifies the dates affected and activity constraints.

There will be no early exams or make-up exams. If you miss an exam you will need to produce a written excuse from a treating physician or counselor.

Grading changes: If you feel that you have been unfairly graded on any course assignment or exam please attach a short statement of explanation to your graded work and put it the envelope outside Prof. Holyoak's office door within one week of when you received the graded assignment. We will not accept grading petitions after the week has passed. In cases where we added or subtracted incorrectly or incorrectly entered a grade into SmartSite, please bring this to our attention as soon as possible.

Resources for success: If you are struggling with this class or with classes in general, or need help with your writing, then we urge you to contact one of the following campus resources: The writing center (for writing help): <http://success.ucdavis.edu/academic/writing.html>. The Student Academic Success Center (study skills): <http://success.ucdavis.edu/study-skills/>.

Course outline

Readings listed are to be read before the lectures or discussions they are listed under (GA=Gwen Arnold, MAH=Marcel Holyoak).

Part 1: Introductory material on environmental science and policy design, implementation, and assessment

Week 1

Sept. 24 Lecture: Introduction to the course and environmental science and policy (GA and MAH)

Week 2

Sept. 29 Lecture: Ecosystems, their cycles, and the role of humans (MAH)

Optional reading: Raven, PH, LR Berg and DM Hassenzahl. 2008. Ecosystems and the Physical Environment. Chapter 5 (pp 88-97) in *Environment*, 6th ed., Wiley.

Sept. 29 and 30 discussion sections: What role should scientists play in policy formation?

Required Readings:

- 1) Weible, Chris. 2007. Stakeholder Perceptions of Scientists: Lake Tahoe Environmental Policy from 1984 to 2001. *Environmental Management* 40:853–865
- 2) Lubchenco J. 1995. The role of science in formulating a biodiversity strategy. *BioScience* 45:S7-S9.

Oct. 1 Lecture: Human population growth and environmental impacts (MAH)

Optional reading: Dimmick, Deniss. 2014. As World's Population Booms, Will Its Resources Be Enough for Us? *National Geographic*.

<http://news.nationalgeographic.com/news/2014/09/140920-population-11billion-demographics-anthropocene/>

Week 3

Oct. 6 Lecture: Scientific investigation methods and environmental monitoring (MAH)

Optional reading: Alexander, M. 2008. Survey, Surveillance, Monitoring and Recording. Chapter 5 (pp 49-62) in *Management Planning for Nature Conservation*, Springer.

Oct. 6 and 7 discussion section: Scientific investigation of environmental issues

Required Readings:

- 1) Vitousek et al. 1997. Human Domination of Earth's Ecosystems. *Science* 277:494-499
- 2) Plowright et al. 2008. Causal inference in disease ecology: investigating ecological drivers of disease emergence. *Frontiers in Ecology and the Environment* 6(8):420-429

Oct. 8 Lecture: Attitudes and approaches in environmental analysis (GA)

Optional readings:

- 1) Rothenberg, L. S. 2002. Chapter I. *Environmental choices: Policy responses to green demands*. Washington, DC: CQ Press.
- 2) Salzman, J., and B. H. Thompson. 2010. Chapter 1. *Environmental law and policy*, 3rd ed. New York: Thompson Reuters.

Week 4

Oct. 13 Lecture: The market and the environment (GA)

Optional reading: Rothenberg, L. S. 2002. Chapter 2. *Environmental choices: Policy responses to green demands*. Washington, DC: CQ Press.

Oct. 13 and 14 discussion section: Environmental assets as economic goods

Required Reading:

Salzman, J., and B. H. Thompson. 2010. Chapter 2. *Environmental law and policy*, 3rd ed. New York: Thompson Reuters.

Oct. 15 Lecture: Instrument choice in environmental policy I (GA)

Optional readings:

- 1) Grantham Research Institute. 2013. Carbon tax vs. cap-and-trade: Which is better? The Guardian. <http://www.theguardian.com/environment/2013/jan/31/carbon-tax-cap-and-trade>
- 2) Harrington, W., and R. D. Morgenstern. 2004. Economic incentives versus command and control. http://www.rff.org/files/sharepoint/WorkImages/Download/RFF_Resources_152_economic_incentives.pdf

Week 5

Oct. 20 Lecture: Instrument choice in environmental policy II (GA)

Optional readings:

- 1) Salzman, J. 2013. Teaching policy instrument choice in environmental law: The five P's. *Duke Environmental Law and Policy Forum* XXIII: 363-376.
- 2) Coglianesi, C., and L. S. Benneer. 2012. The performance of regulatory performance standards. <http://www.regblog.org/2012/05/08/the-performance-of-performance-standards/>
- 3) U.S. Congress Office of Technology Assessment. 1995. Summary. In *Environmental policy tools: A user's guide*, 8-47. OTA-ENV-634. Washington, DC: U.S. Government Printing Office.

Oct.20 and 21 discussion section: Instrument choice activity

Required readings:

- 1) U.S. Congress Office of Technology Assessment. 1995. Executive summary. In *Environmental policy tools: A user's guide*, 1-6. OTA-ENV-634. Washington, DC: U.S. Government Printing Office.

- 2) Goulder, L. H., and I. W. H. Parry. 2008. Instrument choice in environmental policy. *Review of Environmental Economics and Policy* 2 (2): 152-174.

Oct. 22 Lecture: Environmental policy in the U.S. federal system (GA)

Optional reading: Kraft, Michael E., and Norman J. Vig. 2013. Environmental policy over four decades. In *Environmental policy: New directions for the 21st century*, eds. Norman J. Vig and Michael E. Kraft, 2-26. Washington, DC: CQ Press.

Week 6

Oct. 27 Midterm (in class, closed book)

Oct. 27 and 28 discussion sections: No discussion section this week due to the midterm.

Part 2: Biodiversity conservation and the Endangered Species Act

Oct. 29 Lecture: Patterns of biodiversity (MAH)

Optional reading: "conservation." 2010. Encyclopædia Britannica Online.

Week 7

Nov. 3: Non-market valuation and the economic value of biodiversity (GA)

Optional reading: Johnston, R., J.N. Sanchirico, and D. Holland. 2010. Measuring Social Value and Human Welfare. Chapter 4 in *Seas, Society and Human Well-Being* (eds Bowen, Depledge, and Fleming), Jones and Bartlett Publishers (forthcoming book).

Nov. 3 and 4 discussion sections: Conservation and valuation of biodiversity

Required readings:

- 1) Kareiva, P., R. Lalasz, and M. Marvier. 2012. Conservation in the Anthropocene. *Breakthrough Journal*. Winter. <http://thebreakthrough.org/index.php/journal/past-issues/issue-2/conservation-in-the-anthropocene>
- 2) Odling-Smee, L. 2005. Dollars and Sense. *Nature* 437: 614-616.
<http://www.nature.com/nature/journal/v437/n7059/full/437614a.html>
- 3) McCauley, D.J. 2006. Selling out on Nature. *Nature* 443: 27-28.
<http://www.nature.com/nature/journal/v443/n7107/full/443027a.html>
- 4) Brook, B.W. N.S. Sodhi, and C.J.A. Bradshaw. 2008. Synergies among extinction drivers under global change. *Trends in Ecology and Evolution* 23(8): 453-460.

Nov. 5 Lecture: Endangered Species Act and the science behind it (MAH)

Optional reading: Wilcove, DS et al. 1998. Quantifying Threats to Imperiled Species in the United States. *BioScience*, 48:607-615. (plus additional links on SmartSite/specific slides)

Week 8

Nov. 10 Lecture: Economics and politics of the Endangered Species Act (GA)

Optional reading: Brown, G. M., and J. F. Shogren. 1998. Economics of the Endangered Species Act. *The Journal of Economic Perspectives* 12 (3): 3-20.

Nov. 10 and 11 discussion sections: No discussion on 10 or 11 Nov. because Weds. 11 November is Veterans Day holiday.

Part 3: Water resources, policy and management

Nov. 12 Lecture: Water resources and pollution overview

Optional readings:

- 1) For more background browse <http://www.greenfacts.org/en/water-resources/>
- 2) For a great summary of current problems read: United Nations. 2014. Managing Water Under Uncertainty and Risk: Executive Summary. Part 1. Status, Trends and Challenges. 13-38.

Week 9

Nov. 17 Lecture: U.S. water policy

Optional readings:

- 1) Reimer, A. 2013. *U.S. water policy: Trends and future directions*. State College, PA: National Agriculture and Rural Development Policy Center.
- 2) Grantham, T. W., and J. H. Viers. 2014. 100 years of California's water rights system: Pattern, trends, and uncertainty. *Environmental Research Letters* 9: 1-10.

Nov. 17 and 18 discussion sections: Debating California's water future

Required readings:

- 1) Madrigal, A. C. 2014. American aqueduct: The Great California water saga. *The Atlantic*, Feb. 24. <http://www.theatlantic.com/technology/archive/2014/02/american-aqueduct-the-great-california-water-saga/284009/>
- 2) Frank, R. M. 2015. Another inconvenient truth: California water law must change. *San Francisco Chronicle*, April 10. <http://www.sfchronicle.com/opinion/article/Another-inconvenient-truth-California-water-law-6192703.php>.
- 3) Dalmia, S. 2015. The market-based solution to California's water crisis. *The Week*, April 17. <http://theweek.com/articles/550126/marketbased-solution-californias-water-crisis>.
- 4) Wilson, C. 2015. California neglects its "super water right" to manage drought. *Water Deeply*, July 19. <http://www.waterdeeply.org/op-eds/2015/07/8133/california-neglects-super-water-right-manage-drought/>

Part 4: Managing natural resources in a changing climate

Nov. 19: The science of climate change (MAH)

Optional reading: Intergovernmental Panel on Climate Change. 2013-2014. Synthesis Report of

the Fifth Assessment, IPCC, Geneva, Switzerland
(<http://www.ipcc.ch/report/ar5/index.shtml>); see also
<http://www.epa.gov/climatechange/>)

Week 10

Nov 24. Lecture: Economic and policy implications of climate change legislation (GA)
Optional reading: Aldy et al. 2009. Designing Climate Mitigation Policy. Resources for the Future Discussion Paper 08-16-Rev. Washington D.C.

Nov. 24 and 25 discussion sections: No Discussion because 25 November is just before Thanksgiving Holiday

Nov. 26 Lecture: Thanksgiving Holiday, no lecture

Week 11

Dec. 1 Lecture: Ecological and environmental impacts of climate change (MAH)

Optional reading:

- 1) Parmesan, C. and G. Yohe. 2003. A globally coherent fingerprint of climate change impacts across natural systems. *Nature* 421:37-42.
- 2) Thuiller, W. 2007. Biodiversity: Climate change and the ecologist. *Nature* 448:550-552.
- 3) Heller, N. E. and E. S. Zavaleta. 2009. Biodiversity management in the face of climate change: A review of 22 years of recommendations. *Biological Conservation* 142:14-32. (kind of long but worthwhile)

Dec. 1 and 2 discussion section: U.S. climate change mitigation and policy

Required Readings:

- 1) Pacala, S. and Socolow, R. 2004. Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies. *Science* 305:968-972.
- 2) Bodansky, D. 2009. Climate Change: Top 10 Precepts for U.S. Foreign Policy. *Resources for the Future Issue Brief* 09-01.
- 3) Parry, I. W. H. Should We Abandon Cap and Trade in Favor of a CO2 Tax? *Resources*. Summer 2007

Part V: Course review

Dec. 3 Lecture: Course Review (GA and MAH)

Final Exam Wednesday, Dec. 9, 10:30am – 12:30pm in Kleiber 3