

BIOLOGY 375-001: CONSERVATION BIOLOGY

INSTRUCTOR:	Dr. Caroline DeVan	EMAIL:	caroline.m.devan@njit.edu
OFFICE:	340F CKB ▪(973) 596-5404	OFFICE HOURS:	T: 2:00 – 3:30pm, W: 10:00 – 11:30am or by appointment
COURSE SCHEDULE:	T, R: 11:30AM- 12:55PM, CKB 315	COURSE WEBSITE:	http://moodle.njit.edu/

COURSE DESCRIPTION:

Conservation biology is a rapidly developing and complex field. It draws upon the biological disciplines of population biology, taxonomy, ecology, genetics, and resource management as well as the fields of economics, ethics, and politics to document, understand, and protect the world's biodiversity. This course will give students an overview of this emerging discipline including the scientific methods employed, the biological principles behind conservation techniques and strategies as well as the complexities involved in attempts to influence and implement conservation-oriented policies.



PHOTOGRAPH: MARK CONLIN/ALAMY



PREREQUISITES:

- Foundations in Biology: Ecology & Evolution (BIOL 205 & 206)
- Foundations in Biology: Cell & Molecular (R120:201&202)

REQUIRED TEXT:

- A Primer of Conservation Biology, Fifth Edition: Paper Text © 2012 by Richard B. Primack; ISBN: 978-0878936236.

ADDITIONAL READINGS:

Throughout the semester, I'll be providing additional readings to supplement the course text and serve as the basis for class discussions. A tentative list of these readings is included here and any changes will be posted to the course Moodle site.

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iNATURALIST APP: If you have a smart-phone, please download the iNaturalist application (<http://www.inaturalist.org>). This application can be used in Class 2 and for one of your assignments.

LEARNING OUTCOMES:

Students are able to....

1. Describe and explain biological diversity, including how biodiversity relates to ecosystem functioning.
2. Evaluate the various ways that humans value biodiversity and how these valuations relate to conservation efforts.
3. Utilize scientific evidence to identify and explain the important threats to biological diversity as well as how these threats relate to human actions.
4. Evaluate the variety of management approaches to protecting biodiversity and addressing conservation problems.
5. Discuss the multidisciplinary effort required for successful conservation of biodiversity, which includes science, policy, economics, and ethics.
6. Form and articulate opinions, both verbally and written, on the complex issues in conservation biology.
7. Work in groups to solve problems creatively.



GRADING POLICY:

Your grade will be calculated based on the following components:

1. **Participation** (6%): Points are awarded for participation during lecture, class discussions, and in-class group work.
2. **Assignments** (20%): Short assignments will be assigned regularly to assess and provide feedback on your understanding of course material – you will have 10 assignments each worth 5-10 points.
3. **Discussion & Reading Reports** (10%): Discussions on scientific literature related to particular class topics will be held 8 times throughout the semester. To prepare for these discussions, each student will individually prepare a short report as a response to the assigned scientific article. Once a semester, a small group of student will be responsible for leading a class discussion of the scientific literature on a particular topic. Each individual student will be responsible for writing discussion questions in advance and leading the class in discussion.
4. **Case studies** (15%): Case studies will be worked on during class and will explore real-world applications of certain topics. A one-page (single-spaced) written assignment will accompany each case study (5 case studies – 15 pts each).

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GRADING POLICY CONT'D:

- Final Project** (10%): The final project will focus on researching and presenting a local conservation issue and suggested solutions and will include two parts: a) an individual scientific report (20 pts) and b) a group-based effort in the form of a multi-media effort for a non-scientific audience (20 pts) and a short (<10 min) final presentation (10 pts).
- Exams** (40%): There will one mid-term exam and one final exam, each worth 20%. Exams will be predominantly short-answer questions. The final exam will be cumulative, but with an emphasis on the second half of the semester.

GRADES	POINTS
Class Participation	30
Assignments	95
Discussion & reading reports	75
Final project	50
Case Studies	50
Exams	200
Total	500

COURSE POLICIES:

Electronics/Cell Phone Policy: No electronics (cell phones, etc.) in class unless specified by the instructor; laptops permitted for note-taking only or use in an activity

Attendance: You are expected to attend all classes and complete all the assigned readings in advance. We will primarily use our class time to discuss the readings and explore topics in more detail.

Moodle: You must update your Moodle profile with an email address that you check regularly.

Make-Up Exams and Quizzes: Make up exams and quizzes will be permitted only with a doctor's or a dean's letter or with prior approval. If you have a serious reason for missing an exam, you must contact me **BEFORE** the scheduled exam period to notify me that you cannot take the exam.

Late Assignments: Late assignments based on readings will not be accepted. The purpose of the assignments is to prepare you for the upcoming class. Other late assignments (case study, review paper, etc.) will be penalized 10% per day late.

Academic Integrity: I have a zero tolerance policy for academic dishonesty, including plagiarism and cheating. If you have any questions about what constitutes plagiarism or cheating, please ask me or refer to the academic integrity code: [Academic Integrity Code](#).



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COURSE OUTLINE:

Please note that this is the proposed schedule. I reserve the right to make changes to the schedule when needed; you will be notified of any changes. Additional readings and assignments will be posted to the course website. **Blue** = discussion topics & required readings: **Purple** = due dates.

DATE	LECTURE TOPIC	READINGS / NOTES
9/6	Course overview	Syllabus
9/8	Introduction to Biodiversity	Chapter 1 (pp. 2-17), Soulé 1985, Kareiva & Marvier 2012
9/13	Species & Genetic Biodiversity	Chapter 2 (pp. 18-27)
9/15	Patterns of Biodiversity	Chapter 2 (pp. 35-45), May 1992, Gaston 2000
9/20	<i>Ecosystem Diversity</i>	Chapter 2 (pp. 27-35), <i>Estes et al. 2011, Hooper et al. 2012</i>
9/22	<i>Valuing Biodiversity</i>	Chapter 3 (pp. 46-66), <i>Leopold 1949, Costanza et al. 2014</i>
9/27	Case Study 1: Complexity in Conservation	Murphy 2007; Assignment 2 due
9/29	<i>Threats to Biodiversity I</i>	Chapter 4 (pp. 78-92; 98-110), <i>Vitousek et al. 1997, Cincotta et al. 2000, Pimm 2008</i>
10/4	Threats to Biodiversity: Forest Fragmentation	Chapter 4 (pp. 93-98), Foley et al. 2005; Case study #1 due
10/6	<i>Threats to Biodiversity II</i>	Chapter 4 (pp. 110-126), <i>Worm et al. 2006, Fisher & Garner 2007, Davis et al. 2011 & responses</i>
10/11	Case Study 2: Biodiversity Loss & Human Health	Chapter 4 (pp. 126-132), Molyneux et al. 2008; Assignment 3 due
10/13	<i>Extinction</i>	Chapter 5 (pp. 134-150), <i>Laurence 2006, Hubbell et al. 2008</i>
10/18	Small Populations & Genetic Drift	Chapter 5 (pp. 150-167) Pimm et al. 2014; Case study #2 due
10/20	Case Study 3: Caribou Conservation	Background readings, Assignment 1 due
10/25	CONCEPT MAP & REVIEW	Swaigood & Sheppard 2010 & responses
10/27	EXAM 1	Assignment 4 (Concept Map) due
11/1	<i>Applied Population Biology</i>	Chapter 6 (pp. 168-180), <i>Lalas et al. 2007, Redford et al. 2011; Case Study #3 due</i>

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COURSE OUTLINE (CONT.):

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DATE	LECTURE TOPIC	READINGS / ASSIGNMENTS
11/3	Law & Policy	Chapter 6 (pp. 180-190), Rohlf 1991, Taylor et al. 2005
11/8	Case Study 4: Wolf Management	Background readings, Assignment 5 due
11/10	Reintroductions & Ex Situ	Chapter 6 (pp. 191-211), Donlan et al. 2005, Conde et al. 2011, Assignment 6 due
11/15	Protected areas I: Priority setting	Chapter 7 (pp. 212-229), Myers et al. 2000, Stork & Habel 2014; Case Study #4 due
11/17	Protected areas II: Corridors	Chapter 7 (pp. 229-252), Gilbert-Norton et al. 2010
11/22	"Crash": Film	Background readings
11/24	NO CLASS: THANKSGIVING	
11/29	Case Study 5: Wetland Mitigation	Hobb et al. 2009 & background reading; Assignment 7 due
12/1	Unprotected Areas & Sustainable Development	Chapter 8 (pp. 254-281); Lewis et al. 1990, Naidoo et al. 2011, Assignment 8 due
12/6	Sustainable Development & Conservation of the Future	Chapter 9 (pp. 282-309), Hoban & Vernesi 2012, Turner et al. 2012; Case study #5 due
12/8	Student presentations	Final Projects due
12/13	Concept Map & Review	Assignment 9 (Concept Map) due Dec 14
12/15	NO CLASS- READING DAY	EXAM 2 - TBD
FINALS	FINAL EXAM WEEK: DECEMBER 16-22, 2016	

Please let me know if you require accommodations for a disability or if you have any concerns about the course as soon as possible so that I can work with you to resolve them. We are here to help!

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ADDITIONAL READINGS:

If more are added then I will post them to Moodle:

- Bride, I. 2006. The conundrum of conservation education and the conservation mission. *Conservation Biology* **20**: 1337-1339.
- Cincotta R.P. et al. Human population in the biodiversity hotspots. *Nature*. **404**: 990-992.
- Conde, D.A. et al. 2011. An emerging role of zoos to conserve biodiversity. *Science* **331**: 1390-1391.
- Costanza et al. 2014. Changes in the global value of ecosystem services. *Global Environmental Change* **26**: 152-158.
- Davis et al. 2011. Don't judge species on their origins. *Nature* **474**: 153-154.
- Donlan, J. et al. 2005. Re-wilding North America. *Science* **436**: 913-914.
- Estes, J.A. et al. Trophic downgrading of Planet Earth. *Science* **333**: 301-306.
- Foley et al. 2005. Global consequences of land use. *Science*. **309**: 570-574.
- Gaston, K.J. 2000. Global patterns in biodiversity. *Nature* **405**: 220-227.
- Gilbert-Norton et al. 2010. A meta-analytic review of corridor effectiveness. *Conservation Biology* **24**: 660-668.
- Hoban, S. and C. Vernesi. 2012. Challenges in global biodiversity conservation and solutions that cross sociology, politics, economics and ecology. *Biology Letters* **8**: 897-899.
- Hobbs, R. J. et al. 2009. Novel ecosystems: implications for conservation and restoration. *Trends in Ecology and Evolution* **34**: 599-605.
- Hooper, D.U. 2012. A global synthesis reveals biodiversity loss as a driver of ecosystem change. *Nature*. DOI: 10.1038/nature11118
- Hubbell, S.P. et al. 2008. How many tree species are there in the Amazon and how many of them will go extinct? *PNAS* **105**: 11498-11504.
- Kareiva, P. and M. Marvier. 2012. What is Conservation Science? *BioScience* **62**: 962-969
- Lalas, C. et al. 2007. Predation by New Zealand sea lions (*Phocartos hookeri*) as a threat to the viability of yellow-eyed penguins (*Megadyptes antipodes*) at Otago Peninsula, New Zealand. *Biological Conservation* **135**: 235-246.
- Laurance, W.F. 2006. Have we overstated the tropical biodiversity crisis? *TRENDS in Ecology and Evolution* **22**: 65-70.
- Laurance, W.F. et al. 2012. Making conservation research more relevant for conservation practitioners. *Biological Conservation* **153**: 164-168.
- Leopold, A. 1949. The Land Ethic. *Sand County Almanac*.
- Lewis, D. et al. 1990. Wildlife conservation outside protected areas – lessons form an experiment in Zambia. *Conservation Biology* **4**: 171-180.
- May, R.M. 1992 How many species inhabit the earth? *Scientific American*. October: 18-24.
- Molyneux et al. 2008. Chapter 7: Ecosystem disturbance, biodiversity loss, and human infectious disease. *Sustaining Life: How Human Health Depends on Biodiversity*. p.286-323.
- Murphy, K. 2007. Birder admits killing cat, but is it animal cruelty? *The New York Times*
- Myers, N. et al. 2000. Biodiversity hotspots for conservation priorities. *Nature* **403**: 853-858.
- Naidoo, R. et al. 2011. Effect of biodiversity on economic benefits from communal lands in Namibia. *Journal of Applied Ecology* **48**: 310-316.
- Pimm, S.L. 2008. Biodiversity: climate change or habitat loss – which will kill more species? *Current Biology* **18**: R117-119.
- Pimm et al. 2014. The biodiversity of species and their rates of extinction, distribution and protection. *Science* **344**: 987-1002.
- Redford, K.H. et al. 2011. What does it mean to successfully conserve a (vertebrate) species? *BioScience* **61**: 39-48.
- Rohlf, D.J. 1991. Six biological reasons why the Endangered Species Act doesn't work – and what to do about it. *Conservation Biology* **5**: 273-282.
- Soulé M.E. 1985 What is Conservation Biology? *BioScience* **35**: 727-734

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ADDITIONAL READINGS CONT'D:

Stork, N.E. and J.C. Habel. 2014. Can biodiversity hotspots protect more than tropical forest plants and vertebrates? *Journal of Biogeography* **41**:421-428.

Swaisgood R.R. and J.K. Sheppard. 2010. The culture of conservation biologists: show me the hope! *BioScience* **60**: 626-630.

Taylor, M.F.J. et al. The effectiveness of the Endangered Species Act: a quantitative analysis. *BioScience* **55**:360-367.

Turner, W.R. et al. 2012. Global biodiversity conservation and the alleviation of poverty. *BioScience* **62**: 85-92.

Vitousek, P.M. et al. Human domination of Earth's ecosystems. *Science* **227**: 494-499.

Worm et al. 2006 Impacts of biodiversity loss on ocean ecosystem services. *Science* **314**: 787-790.