

READINGS IN GLOBAL CHANGE BIOLOGY- PBIO 3953

INSTRUCTOR

Dr. Lara Souza

Email: lara.souza@ou.edu

Phone: 325-6057

Office: GLCH 31

Office hours: MW 10:30am-11:30am

CLASSROOM COMMUNICATION. Check the D2L site and your email frequently. All of the readings will be available on the site.

TEXTBOOK. Chapters from “Impacts of Climate Change on Biodiversity, Ecosystems, and Ecosystem Services: technical input to the 2013 National Climate Assessment”, “Climate Change Biology” by Lee Hannah, “Climate Change and Biodiversity” by Thomas Lovejoy, “Invasion Ecology” by Julie Lockwood, Martha Hoopes, Michael Marchetti.

LEARNING OBJECTIVES. We will read, discuss and synthesize key literature in global change biology using a combination of lectures, in-class activities, and in-class discussions of primary literature. We will explore the impacts of two main global change factors, climatic change and invasive species, influencing biodiversity, ecosystem structure and function with a final focus on the potential of adaptation and conservation approaches and utilizations of models to help us predict future impacts.

ASSESSMENT. To assess how well you meet these objectives, you will have comprehensive exams, in-class activities & discussions of and a final project where you will review and synthesize the impact of a global change factor on key response variables by using a qualitative review (undergraduate students) or meta-analysis (graduate students). Your grades will be based on the following schemes:

MID-TERM AND FINAL EXAM. Exams will consist of short answers based on lecture materials and weekly articles discussed on Fridays.

IN-CLASS ACTIVITIES. In-class activities will entail group (2-3 students per group) short answers/ essays from in class readings of primary literature and analysis of scientific datasets.

THE FINAL PROJECT. The objective of the final project is to give each student an opportunity to synthesize a topic within global change (climate change or biological invasions) by executing a qualitative (e.g., point count) or quantitative (e.g., meta-analysis) of an important response variable across different ecosystems or multiple response variables across similar ecosystems. By the 9th week of the semester (week of October 19th), you should decide on a topic turning in a brief summary of what the qualitative/quantitative review will cover (outline).

GRADING SYSTEM.

In-Class Activities	60 points (15%)
Article Discussion	30 points (8%)
Mid Term	75 points (19%)
Review/MetaAnalysis	100 points (26%)
Final Exam	125 points (32%)
Total	390 points

SCHEDULE OF EVENTS

Week	Day	Lecture	Reading/ Activity
1	24-Aug	An introduction to climate change biology	
	26-Aug	An introduction to climate change biology	In-Class Activity 1
	28-Aug	An introduction to climate change biology	R1
2	31-Aug	An introduction to invasion ecology	
	02-Sep	An introduction to invasion ecology	In-Class Activity 2
	04-Sep	An introduction to invasion ecology	R2
3	7-Sep	NO CLASS	
	9-Sep	Climate change & shifts in species distributions	In-Class Activity 3
	11-Sep	Climate change & shifts in species distributions	R3
4	14-Sep	Climate change and shifts in phenology	
	16-Sep	Climate change and shifts in phenology	In-Class Activity 4
	18-Sep	Climate change and shifts in phenology	R4
5	21-Sep	Invasion and Homogenization	
	23-Sep	Invasion and Homogenization	In-Class Activity 5
	25-Sep	Invasion and Homogenization	R5
6	28-Sep	Ecosystem impacts: climate change	
	30-Sep	Ecosystem impacts: climate change	In-Class Activity 6
	02-Oct	Ecosystem impacts: climate change	R6
7	5-Oct	Ecosystem Management: climate change	SCCSC Guest Speaker
	7-Oct	Ecosystem Management: biological invasions	TNC Guest Speaker
	9-Oct	NO CLASS	
8	12-Oct	Biotic Resistance and invasion ecology	
	14-Oct	Biotic Resistance and invasion ecology	In-Class Activity 7
	16-Oct	Biotic Resistance and invasion ecology	R7

SCHEDULE OF EVENTS

Week	Day	Lecture	Reading/ Activity
9	19-Oct	Mid-Term	
	21-Oct	Enemy Release and invasion ecology	In-Class Activity 8
	23-Oct	Enemy Release and invasion ecology	R8
10	26-Oct	Propagule Pressure and invasion ecology	
	28-Oct	Propagule Pressure and invasion ecology	In-Class Activity 9
	30-Oct	Propagule Pressure and invasion ecology	R9
11	02-Nov	Ecosystem impacts: invasion ecology	
	04-Nov	Ecosystem impacts: invasion ecology	In-Class Activity 10
	06-Nov	Ecosystem impacts: invasion ecology	R10
12	09-Nov	Individual Meetings about Final Project	
	11-Nov	Climate change and Evolution	
	13-Nov	Climate change and Evolution	R11
13	16-Nov	Invasion Ecology and Evolution	
	18-Nov	Invasion Ecology and Evolution	R12
	20-Nov	NO CLASS	Work individually on Final Project
14	23-Nov	Predicting adaptation to climate change	R13
	25-Nov	NO CLASS	
	27-Nov	NO CLASS	
15	30-Nov	Predicting adaptation to biological invasions	R14
	2-Dec	REVIEW	
	4-Dec	FINAL PRESENTATIONS	
	7-Dec	FINAL PRESENTATIONS	
	9-Dec	FINAL PRESENTATIONS	
	11-Dec	FINAL PRESENTATIONS (Final Paper Due)	
16	15-Dec	FINAL EXAM (8am-10am)	

READINGS

- (R1)** Walther, G. R. 2010. Community and ecosystem responses to recent climate change. *Philosophical Transactions of the Royal Society B-Biological Sciences* 365:2019-2024.
- (R2)** Vila, M., Espinar J.L., Hejda, M., Hulme, P.E., Jarosik, V., Maron, J.L., Pergl, J., Schaffner, U., Sun, Y., Pysek, P. 2011. Ecological impacts of invasive alien plants: a meta-analysis of their effects on species, communities and ecosystems. *Ecology letters*. 14: 702-708.
- (R3)** Chen et al. 2011. Rapid range shifts of species associated with high levels of climatic warming. *Science*. 333:1024.
- (R4)** Menzel, A., T. H. Sparks, N. Estrella, E. Koch, A. Aasa, R. Ahas, K. Alm-Kubler, P. Bissolli, O. Braslavská, A. Briede, F. M. Chmielewski, Z. Crepinsek, Y. Curnel, A. Dahl, C. Defila, A. Donnelly, Y. Filella, K. Jatcza, F. Mage, A. Mestre, O. Nordli, J. Penuelas, P. Pirinen, V. Remisova, H. Scheifinger, M. Striz, A. Susnik, A. J. H. Van Vliet, F. E. Wielgolaski, S. Zach, and A. Zust. 2006. European phenological response to climate change matches the warming pattern. *Global Change Biology* 12:1969-1976.
- (R5)** McKinney ML. 2006. Urbanization as a major cause of biotic homogenization. *Biological Conservation*. 127: 247-260.
- (R6)** Hoegh-Guldberg et al. 2010. The impact of climate change on the world's marine ecosystems. *Science*. 328: 1523.
- (R7)** Fridley JD, Stachowicz JJ, Naeem S, Sax DF, Seaboom EW, Smith MD, Stolghren TJ, Tilman D, Von Holle B. 2007. The invasion paradox: reconciling pattern and process in species invasions. *Ecology*. 88:3-17.
- (R8)** Callaway, RM, Thelen, GC, Rodrigues, A, Holben, WE. 2004. Soil431: biota and exotic plant invasion. *Nature* 7:975-989.
- (R9)** Lockwood, JL, Cassey, P, Blackburn, T. 2005. The role of propagule pressure in explaining species invasions. *Trends in Ecology and Evolution* 20: 223-228.
- (R10)** Simberloff D. 2011. How common are invasion-induced ecosystem impacts? *Biological Invasions* 13: 1255-1268.
- (R11)** Franks, SJ, Sim, S, Weis, AE. 2007. Rapid evolution of flowering time by an annual plant in response to climate fluctuation. *PNAS*. 104:1278-1282.

(R12) Kolbe, JJ, Glor, RE, Schettino LR, Lara AC, Larson, A, Losos, JB. 2004. Genetic variation increases during biological invasion by a Cuban Lizard. *Nature*. 431: 177-181.

(R13) Cross et al. 2012. Adaptation to impacts of climate change on biodiversity, ecosystems, and ecosystems services. In: *Impacts of Climate Change on Biodiversity, Ecosystems, and Ecosystem Services*. Technical Input to the 2013 National Climate Assessment.

(14) Keller SR, Taylor DR. 2008. History, chance and adaptation during biological invasion: separating stochastic phenotypic evolution from response to selection *Ecology Letters* 11: 852-866

OTHER CONSIDERATIONS.

Students with documented disabilities requiring special accommodations should talk to the Instructor as soon as possible, as well as contact the Office of Disability Services (325-3163).

Cheating, plagiarism, and academic misconduct will not be tolerated. Please see <http://integrity.ou.edu> for more information.