Bio 359: Ecosystem Ecology
Spring 2018
Syllabus

Location and Course Meeting Times:

Lectures: T, TH 9:55-11:10 - 119 Ho
Labs: T 1:20-4:10 - 236 HO

Professors:
Court Campany
Research Area: All aspects of plant biology and ecosystem ecology
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Office Hours: Monday 3:00-4:30pm, Friday 8:30-10:00am or by appointment

Course Goals:
1) To help you understanding the basic principles and concepts of ecosystem ecology, the impacts of human-induced global changes and how these changes are affecting ecosystem processes.
2) To provide you with modern data science skills that are increasingly required in post-collegiate careers
3) To critically evaluate and understand the primary scientific literature.
4) To engage environmental activism through grand challenge initiative projects

Course website: http://moodle.colgate.edu/ I encourage you to visit the website frequently. Any changes, last minute notes, etc. will be posted. **I also reserve the right to make changes to this syllabus as the semester progresses**, which will be posted on the moodle site.

Required Text:
Principles of Terrestrial Ecology / F. Stuart Chapin III, Pamela A. Matson, Peter M. Vitousek
(this will be available in the bookstore but the first edition is available for free as a pdf!)

A Learning Guide to R /Remko Duursma, Jeff Powell & Glenn Stone (provided bookstore)

Jigsaw Readings are posted on Moodle

Grading:

Lecture	**Percentage of Final Grade**
Exam 1	30%
Exam 2	30%
Grand Challenge Initiative	30%
Group Jigsaw	5%
Class Participation	5%
Laboratory	**Percentage of Final Grade**
Learn R assignments (x2)	10%
GCI Background Presentation	25%
Data Science Exercises (x5)	60%
Class Participation	5%

*Rubrics for grading breakdown of GCI and Data Science exercises are posted on Moodle

Exams:
Two exams will be given during the semester. Exams will be short essay format with synthetic discussion questions that will require you to incorporate knowledge from lecture, text, and scientific readings. Make-up exams will be given for ***extreme*** cases only; with written documentation of the reason the exam was missed. In the event that an exam must be postponed due to cancellation of a class meeting, it is to be assumed that the exam will be re-scheduled for the next lecture period (unless announced otherwise).

Grand Challenge Initiative:
This semester we will be running modified versions of Global Grand Challenges, focused on major current ecological issues. Information on Grand Challenges can be found at https://grandchallenges.org and https://www.chapman.edu/scst/undergraduate/grand-challenges-initiative.aspx. You will work as small interdisciplinary teams to tackle an assigned ecological problem. You must work efficiently and collaboratively as a complete unit to develop background and knowledge gap materials, design a written ecological action plan and present your forward-thinking solutions during the final exam time slot. Approximately, half of our laboratory time will be devoted to this effort **so full attendance in all labs is required**. There is one grade (+ self-assessment) per team, so it is necessary to treat this project as if it were a real-world job assignment.

Data Science Exercises:
The quality and quantity of data available in ecological and environmental research as exploded over the past decades. As such, data science is now an emerging and necessary trend in biology field. Leveraging available data allows scientists to address both new and old scientific questions with new insights and improved rigor. In this class I will introduce you to data science coding via the R programming language. Once comfortable with the basics, you will be tasked with exploring mystery datasets that are relevant to ecosystem ecology. The goal will be for you to learn and become comfortable with manipulating and visualizing data. The focus will not be on statistics, but instead the aforementioned steps where you will be tasked with identifying patterns and interpreting what you believe the data show. As most graduate

students will immediately learn to code in some capacity, this concept also aims to give you a 'leg up' in post-undergraduate endeavors.

Lecture Schedule

Date	Topic	Readings
M 1/22	Syllabus, short meeting	
T, 1.23	The Ecosystem Concept	Chapter 1, Pickett 2002
TH, 1/25	Grand Challenge Initiative	
T, 1/30	Earth's Climate System	Chapter 2
TH, 2/1	Jigsaw – Climate	Brook 2005, Lenten 2008 & Buntgen 2011
T, 2/6	Geology & Soils	Chapter 3
TH, 2/8	Jigsaw – Soils	Post 1982, Lai 2004 & Crowther 2016
T, 2/13	C cycling and Productivity	Chapter 5
TH, 2/15	Jigsaw – NPP	Schuur 2001, Krausmann 2013 & Michaletz 2016
T, 2/20	Plant C budgets	Chapter 6
TH, 2/22	Jigsaw – Biomass distributions	Enquist 2003, Reich 2014 & Poorter 2015
T, 2/27	Nutrient Cycling	Chapter 7/8/9
TH, 3/1	Jigsaw – Nutrients	Wardle 2004, Averil 2014 & Terrer 2016
T, 3/6	Energy & Water balance	Chapter 4
TH, 3/8	Exam 1	**submit group jigsaw papers (3)
	SPRING BREAK	
T, 3/20	Disturbance and Succession	Chapter 12
TH, 3/22	Jigsaw - Disturbance	Hobbs 1992, Running 2008 & Thom 2016
T, 3/27	Anthropogenic Changes	Chapter 14
TH, 3/29	Jigsaw – Ecosystem Models	Xu 2016, Brown 2017 & Park 2018
T, 4/3	FACE experiments	
TH, 4/5	Jigsaw – FACE	Iversen 2008, Phillips 2011 & Duursma 2016
T, 4/10	Species Effects	Chapter 11
TH, 4/12	Jigsaw - Diversity	Grimm 1998, Macdougall 2013 & Lange 2014
T, 4/17	Landscape Heterogeneity	Chapter 13
TH, 4/19	Exam 2	
T, 4/24	JIGSAW – Fire	Keeley 1999, Syphard 2007 & Calkin 2013
TH, 4/26	JIGSAW – Invasive	Wittmann 2014, Pyke 2008 & Blossey 1994
T, 5/1	JIGSAW – Coral	Roberts 1991, D'Angelo 2014 & Mumby 2014
TH, 5/3	SETSs, GCI group work	
T, 5/8	Final Exam (12:00 – 2:00)	

* **Journal articles may be changed at short notice (i.e. recently published relevant paper), so monitor announcements on the moodle site**

Lab Schedule (Tuesday afternoons)

Date	Topic	Assignment
1/23	No lab	
1/30	Learn R in a day	2 pdf figures
2/6	Learn R markdown	html report
2/13	Mystery data #1	html report
2/20	GCI background	20m presentation
2/27	Mystery data #2	html report
3/6	GCI group work	
3/20	Mystery data #3	html report
3/27	GCI group work	
4/3	Mystery data #4	html report
4/10	GCI group work	
4/17	Self-driven field data (groups of 2)	html report
4/24	Self-driven field data	
5/1	Sets, JIGSAW – Mountain, GCI	Hart 2014, Anderegg 2015 & USDA 2018

Sufficient time is scheduled into lab timeslots for mentoring, group discussions and research into individual Grand Challenge projects. An html report will be assigned following each data science exercise and will be due before to the following Tuesday lecture. Assignments turned in late will receive a 15% per day penalty.

Collaboration: I strongly encourage you to work with your peers on the laboratory assignments—NOT write/code for each other, but discuss findings. We will be using the "Slack" team messaging app to help each other with coding and interpretation during and outside of labs. Remember—SCIENCE IS COLLABORATIVE!

ADA Statement: If you feel you may need an accommodation based on the impact of a disability, you should contact me privately to discuss your specific needs. If you have not already done so, please contact Lynn Waldman at the Office of Academic Support and Disability Services in the Center for Learning, Teaching, and Research. Ms. Waldman is responsible for determining reasonable and appropriate accommodations for students with disabilities on a case-by-case basis, and more generally, for ensuring that members of the community with disabilities have access to Colgate's programs and services. She also assists students in identifying and managing the factors that may interfere with learning and in developing strategies to enhance learning. Her services are available free of charge to all students.

Academic Dishonesty: Colgate University defines academic dishonesty as any attempt to misrepresent one's performance on any academic exercise submitted for evaluation. In any situation where a student questions the appropriateness of representing a work as his or her own, it will be the student's responsibility to raise the question with the instructor. Ignorance of University policy concerning academic dishonesty shall not be a defense in any University

Student Conduct Board proceeding. Any form of academic dishonesty will be dealt with according to the standards established by Colgate University.