PCB 5443
ADVANCED ECOLOGY: Communities and Ecosystems
Spring 2017

Times: Tuesdays MMC: 8:00-10:30AM; Thursdays BBC: 8:00-10:30AM
Locations: MMC AHC-4 202; BBC AC1 226A
Instructor: John Kominoski - office MMC OE 207; 305-348-7117; jkominos@fiu.edu

Textbooks:
Chapin, F.S., P.A. Matson, and P.M. Vitousek. 2011. Principles of Terrestrial Ecosystem Ecology, 2nd Edition, Springer. ISBN 1441995048; http://link.springer.com/book/10.1007%2F978-1-4419-9504-9

Weathers, K.C., D.L. Strayer, and G.E. Likens. 2013. Fundamentals of Ecosystem Science, Elsevier. ISBN 978-0-12-088774-3; http://www.sciencedirect.com/science/book/9780120887743

Optional:
Coleman, D.C. 2010. Big Ecology: The Emergence of Ecosystem Science. University of California Press. ISBN 978-0-520-26475-5

Golley, F.B. 1993. A History of the Ecosystem Concept: More Than The Sum of Its Parts, Yale University Press. ISBN 0300055463

Other student materials: You must bring a laptop computer or tablet to class with program R installed and functioning (see notes below).

Class webpage: I will use Dropbox to distribute documents. Course syllabus, reading list, and assignments can be found at **kominoskilab.wordpress.com/ecosystems**

Date	Topic	Topical reading	Text
	History, Energetics, Biogeochemical Cycles		(**bolded** = required)
10-12 Jan	Course Overview & The Ecosystem Concept	Tansley 1935; Odum 1969	**C1**; W1
17-19 Jan	Community Development & The Ecosystem Concept	Connell and Slayter 1977; Bormann and Likens 1967	
	Ecosystem Energetics & Trophic Dynamics	Lindeman 1942; Hairston et al. 1960; Pace et al. 2004	**C10**; W2-3
24-26 Jan	Carbon Cycle (Photosynthesis, GPP, NPP)	Chapin et al. 2006; Fourqurean et al. 2012	**C5-6**; W5-6
	Carbon Cycle (Decomposition)	Manzoni and Porporato 2009; Woodward et al. 2012	**C7**; W4
31-02 Feb	Nitrogen and Phosphorus Cycles	Schindler 1977; Slavik et al. 2004; Ardón et al. 2013	**C8-9**; W7-8
	Nitrogen and Phosphorus Cycles	Mulholland et al. 2008; Norby et al. 2010; Mann et al. 2014	**C14**
	Exam 1		
	Foundational Theories		
07-09 Feb	Niche & Neutral Theories	Tilman 2004; Hubbell 2006	
	Niche & Neutral Theories	Fargione and Tilman 2005; Adler et al. 2007	
14-16 Feb	Metabolic Theory of Ecology	Brown et al. 2004 and forum papers	

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21-23 Feb	Consumer-Resource Interactions	Tilman 1985; Hunter and Price 1992; Power 1992	
	Consumer-Resource Interactions	Rooney and McCann 2012; Borer et al. 2014	
28-02 March	Ecological Stoichiometry	Elser et al. 2007; Hessen et al. 2013	
	Ecological Stoichiometry	Cross et al. 2015; Kominoski et al. 2015	
	Exam 2		
07-09 March	Biodiversity-Ecosystem Functioning	Tilman 1996; Hector et al. 2002; Srivastava et al. 2009; Hopper et al. 2012	**C11**
	Biodiversity-Ecosystem Functioning	Chase and Leibold 2002; Wardle et al. 2004; Gamfeldt et al. 2008	
14-16 March	**SPRING BREAK – NO CLASS**		
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	Integrating Communities & Ecosystems		
21-23 March	Predator Loss & Trophic Downgrading	Pauly et al. 1998; Schmitz 2007; Bruno et al. 2005; Estes et al. 2011	
	Ecosystem Resilience	Scheffer and Carpenter 2003; Folke et al. 2004	**C12**
28-30 March	Ecosystem Stability	McCann 2000; Ives and Carpenter 2007	**W10-11**
	Ecosystem Variance	Peters et al. 2004; Dodds et al. 2012	
	Exam 3	**NSF DDIG Proposal Draft 1 Due**	
	Spatial & Temporal Scales, Predictions		
04-06 April	Ecosystem Modeling	Bolker et al. 1998; Clark 2005	Ecosystem metabolism modeling
	Ecosystem Sustainability & Global Change	Matson et al. 1997; Tilman et al. 2002; Zeng et al. 2014	W12; **C15**
11-13 April	Ecosystem – Species Declines & Invasions	Kennedy et al. 2002; Strayer et al. 2006; Taylor et al. 2006; Dorcas et al. 2012	
	Ecosystem Connectivity & Landscapes	Polis et al. 1997; Baxter et al. 2004; Walters et al. 2008	**C13**
18-20 April	Ecosystem Services	Costanza et al. 1997; Daily and Matson 2008	
	Ecosystem Conservation & Restoration	Franklin 1993; Ogden et al. 2005; Sklar et al. 2005	**W17**
25-27 April	**Final Exams Week**	**NSF DDIG Proposal Draft 2 Due**	

Class Notes

Purpose: Provide a common foundation of the history, concepts, theories, and applications of community and ecosystem science for graduate students training to be ecologists. Each class will address a different concept or theory. Two textbooks will be used to provide background material for lectures and discussions of current papers from the primary literature. You may also benefit by access to a general ecology textbook as a reference for things you may have forgotten from your undergraduate classes, as well as the two optional

textbooks on historical and modern foundations in ecosystem ecology. Students must familiarize themselves with basic graphing and analyses of community and ecosystem data in program R.

Pedagogy: Classes will contain a balance of lecture and discussion. Class time is used for answering student questions, discussions of the material, review of core topics, and working with data from the Florida Coastal Everglades Long-Term Ecological Research program (www.fcelter.fiu.edu/data), other publically available data of the students' choice, or the students' data from thesis or dissertation work. Students will be required to graph, analyze, and interpret ecosystem data on exams. Students will be required to develop a NSF Doctoral Dissertation Improvement Grant (DDIG) proposal. http://www.nsf.gov/pubs/2013/nsf13568/nsf13568.htm

Student responsibilities: You are expected to do the assigned reading before class work and participate in class discussions throughout the term. You must bring a laptop computer or tablet to class capable of running programs R and RStudio.

Grades: There will be three exams and two drafts of a NSF DDIG proposal. Your performance on these tests will account for 35% of your final grade. You must complete two drafts of a NSF DDIG and provide anonymous peer review of two first-draft proposals of fellow classmates during the semester (combined 35% of the total points). Finally, 30% of your grade will be derived from your participation in readings and class discussions.

Exams. Exams will consistent of 3-4 essay questions associated with various topics from textbooks and primary literature discussed in class. Students will be required to graph, analyze, and interpret data in order to answer some questions. Exams will be given and completed outside of class. Completed exams are due by 5PM EST/EDT the date of the exam. Exams are closed book.

Proposals. NSF DDIG proposals will be evaluated for novelty, tractability, clarity, and concreteness. Evaluations will address the standard NSF criteria (Intellectual Merit, Broader Impacts). Students will also be evaluated on the quality and thoughtfulness of the feedback they provide in anonymous peer reviews of first-draft proposals.

Participation. Attendance in class in required and essential to obtaining a high grade. Students who miss class must submit to the Dropbox folder a paragraph summary of discussion points for each paper discussed in class on the day that the student was absent.

Computing: Download the free computer program R at: http://www.r-project.org and RStudio at: http://www.rstudio.com/products/RStudio/#Desk

You will be required to work with community and ecosystem data (your own or publically available) that you use to help develop your NSF DDIG proposal.