Biology 669-001:
Theory of Global Biodiversity
Spring 2019

Meeting time: 2 hrs once/week, TBA
Meeting location: TBA

Office hours: by appointment

Instructor: Allen Hurlbert
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Life exhibits a stunning diversity of form and function, and that diversity is arrayed unevenly across the globe. This course will use a recent book by Worm & Tittensor to explore those patterns and the hypotheses that have been put forward to explain them. Any understanding must ultimately embrace the interplay of ecology and evolution over long timescales and large spatial scales.

Course goals: Students will learn 1) about global diversity patterns for a wide range of taxa, 2) become familiar with the major hypotheses for global diversity gradients, 3) learn how to evaluate macroecological and macroevolutionary evidence for these hypotheses, and 4) make use of an eco-evolutionary simulation model in R in order to generate predictions for macroecological and macroevolutionary patterns under these different hypotheses.

Course requirements: The course is open to graduate students and advanced undergraduates in the biological or environmental sciences. Undergraduates must have completed Biology 201 and at least one advanced (400 level and above) Biology course. Experience in reading and understanding the primary research literature in some area of biology is also important. Some familiarity with the basics of the R programming language is desirable. Undergraduates must have permission of the instructor to enroll (or remain) in the class.

Text: *A Theory of Global Biodiversity*, Boris Worm and Derek Tittensor, Princeton University Press, 2018.

Grading policy:
Attendance and participation in class activities: **60%**
Leading in-class discussion: **30%**
Final exam: **10%**

Schedule

Date	Topic	Assigned reading
Wk of 1/14	Introduction, Observed patterns of marine realm	1-35
Wk of 1/21	Terrestrial biodiversity, patterns over time (MLK HOLIDAY)	35-55
Wk of 1/28	Drivers and predictors of biodiversity	56-73
Wk of 2/4	Framework for biodiversity hypotheses	Pontarp et al. 2019 TREE
Wk of 2/11	Scale, empirical predictors of diversity	73-92
Wk of 2/18	Developing a theory of global biodiversity I	93-109
Wk of 2/25	Developing a theory of global biodiversity II	109-123

Wk of 3/4	Predicting biodiversity patterns from theory	124-148
Wk of 3/11	SPRING BREAK	
Wk of 3/18	A simulation model for biodiversity gradients	Hurlbert & Stegen 2014a
Wk of 3/25	Designing and running simulation experiments	Hurlbert & Stegen 2014b
Wk of 4/1	Analyzing simulation results	
Wk of 4/8	Presentation of findings	
Wk of 4/15	Conservation applications	149-170
Wk of 4/22	Conclusions and future research	171-184

Note: *Unforeseen circumstances can arise during the semester, which may require a change to the class schedule or policies. In such circumstances, the instructor reserves the right to make any necessary changes and will notify the students of these changes as soon as possible.*