Introduction to Ecology schedule

## Syllabus for *Introduction to Ecology*

BI 276f, 2 Credits, Fall 2017

Ecology is the study of the spatial and temporal patterns of the distribution and abundance of organisms, including causes and consequences. Studying these patterns provides us with the scientific foundation for understanding natural processes and environmental problems. This course will examine ecological interactions at a wide range of scales from the molecular level, through individuals, populations, communities, ecosystems, and ultimately to the biosphere. We will study how these interactions produce the patterns and processes we observe around the world. In the field-based laboratory we will learn to generate testable ecological hypotheses, develop experimental designs to test our hypotheses, and use statistical inference to quantiatively assess the outcome of our experiments, while gaining first-hand familiarity with local ecological communities.

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Ecology is broadly defined as the study the spatial and temporal patterns of the distribution and abundance of organisms, including causes and consequences. Scales of ecological inquiry begin at the molecular level and span through individual organisms, populations, communities, ecosystems, landscapes, and ultimately through the biosphere. A 200-level ecology course will may emphasize the importance of ecological principles for guiding conservation of biodiversity and environmental quality, and draw on empirical examples from temperate, tropical, and polar biomes, including human-dominated ecosystems. {:/comment}

#### Professor information

Dr. Christopher M. Moore  
Email: <life.dispersing@gmail.com>  
Office: TBA  
Office phone: TBA  
Calendar: TBA

#### Meeting dates, times, and location

MWF, 9--9:50 AM, ???

#### Text

*Ecology*, 3rd ed., 2013, by Michael L. Cain, William D. Bowman, and Sally D. Hacker, published by Sinauer Associates, Inc.  
(Note that the 4th ed. published by Oxford University Press in 2017 will suffice)

### Learning Goals for Ecology

A. Learn the vocabulary and conceptual framework for the science of ecology.  
B. Mature in ability to assess scientific literature, with a special emphasis on data interpretation.  
C. Apply concepts and principles to topical ecological issues having implications for policy or management.  
D. Gain direct experience with generating hypotheses, developing experimental designs and applying statistical analyses to ecological data.  
E. Gain first-hand familiarity with local ecological communities.

#### Concepts to be addressed in a general ecology lecture syllabus

|  |  |
| --- | --- |
| Concept | Topics |
| Introduction | Definitions, scientific method, graphing, data interpretation |
| Biogeography | Climate, biomes, island-biogeography, species-area relationships |
| Evolutionary ecology | Evolution, adaptation, life history |
| Population ecology | Population growth and regulation, demography, metapopulations, stochasticity |
| Species interactions | Mutualism, competition, predator-prey, host-parasite |
| Community ecology | Community structure, food webs, community metrics, succession, metacommunities |
| Ecosystem ecology | Energy flow, decomposition, primary and secondary production |
| Nutrient cycles | Global nitrogen, phosphorus, and carbon cycles, human influences, land-atmosphere-ocean interactions |

#### Website

<http://mutualismecology.com/Teaching/Ecology>

### Grading

#### Lecture, 65%

|  |  |  |
| --- | --- | --- |
| Item | Percentage of course | Percentate of lecture (rounded) |
| Assessment I | 20% | 31% |
| Assessment II | 20% | 31% |
| Assessment III | 25% | 38% |

#### Laboratory, 35%

|  |  |  |
| --- | --- | --- |
| Item | Percentage of course | Percentage of laboratory (rounded) |
| Practical I | 12.5% | 36% |
| Practical II | 12.5% | 36% |
| Assignments | 10% | 28% |

### Lecture schedule (38 lectures)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Meeting | Date | Day | Module | Lecture | Reading |
| 1 |  |  | Course introduction | Course introduction |  |
| 2 |  |  | Autecology | The domain of ecology |  |
| 3 |  |  |  | Evolution |  |
| 4 |  |  |  | Evolutionary ecology |  |
| 5 |  |  |  | The ecological niche |  |
| 6 |  |  |  | Physiological ecology: animals |  |
| 7 |  |  |  | Physiological ecology: plants |  |
| 8 |  |  |  | Habitat selection |  |
| 9 |  |  |  | Foraging |  |
| 10 |  |  |  | Sociality |  |
| 11 |  |  |  | Life history |  |
| 12 |  |  |  | Assessment I review |  |
| 13 |  |  |  | Assessment I |  |
| 14 |  |  | Population ecology | Exponential growth |  |
| 15 |  |  |  | Self limitation |  |
| 16 |  |  |  | Stage and age structured populations |  |
| 17 |  |  |  | Metapopulations |  |
| 18 |  |  |  | Deterministic and stochastic dynamics |  |
| 19 |  |  |  | Competition |  |
| 20 |  |  |  | Predator-prey |  |
| 21 |  |  |  | Mutualism |  |
| 22 |  |  |  | Plant-herbivore/host-parasite |  |
| 23 |  |  |  | Ecological epidemiology |  |
| 24 |  |  |  | Coevolution |  |
| 25 |  |  |  | Assessment II review |  |
| 26 |  |  |  | Assessment II |  |
| 27 |  |  | Communities and ecosystems | Biodiversity (evolution, measurements, concepts, biogeography) |  |
| 28 |  |  |  | Community statics (e.g., measurement, definitions) |  |
| 29 |  |  |  | Community dynamics: assembly (e.g., niche, neutral) |  |
| 30 |  |  |  | Community dynamics: metacommunities |  |
| 31 |  |  |  | Macroecology |  |
| 32 |  |  |  | Trophic ecology (incl. food webs, top-down and bottom-up regulation) |  |
| 33 |  |  |  | Energy flows |  |
| 34 |  |  |  | Carbon cycling |  |
| 35 |  |  |  | Nitrogen cycling |  |
| 36 |  |  |  | Biodiversity and ecosystem functioning |  |
| 37 |  |  |  | Ecology in the Anthropocene |  |
| 38 |  |  |  | Assessment III review |  |
| 39 |  |  |  | Assessment III |  |

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