

Concordia University

COMMUNITIES AND ECOSYSTEMS (BIOL 353/4)

Tentative Content & Schedule

SEMESTER	WINTER 2015
DAY / TIME	Wednesday & Friday / 8:45-10:00am
ROOM	LOY – HB 130
INSTRUCTOR	Jean-Philippe Lessard
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Part A – Patterns of Community Structure How many species, which one, where and when?

1. Introduction: definitions, approaches to the study of communities and ecosystems (Ch. 1)
2. Quantification of community structure: species composition, species richness, relative abundance and dominance, indices of diversity and evenness (Ch. 16)
3. Community change in space I: global patterns of species composition, the biomes, biogeographic regions and ecoregions (Ch. 23)
4. Community change in space II: global patterns of species richness, latitudinal and elevational gradients (Ch. 27)

Part B – Determinants of Community Structure How are communities formed and maintained?

5. Temporal dynamics: succession theory, types of succession, mechanisms for succession, community assembly theory (Ch. 17)
6. Spatial Dynamics: Theory of Island Biogeography, Metacommunity Framework (Ch. 12, 18)
7. Coexistence: neutral vs. niche-based theories of coexistence (Ch. 13, 16)
8. Evolutionary dynamics: speciation, evolution, character displacement (Ch. 6, 13)
9. Historical factors: regional species pools, diversification, historical biogeography (not covered in text book)

Part C – Species Interactions in Food Webs

What are the different types of interactions occurring among species?

10. Competitive interactions: competitive exclusion, behavioral dominance (Ch. 13)
11. Positive interactions: facilitation, mutualisms (Ch. 15)
12. Trophic interactions: predator-prey, plant-herbivores (Ch. 14)
13. Food chains: top-down vs. bottom-up views (Ch. 16)
14. Food webs: complexity, network theory (Ch. 16)

Part D – Ecosystem Ecology and Processes

How do ecosystems function?

15. Productivity and energy flow (Ch. 20)
16. Decomposition and nutrient cycling (Ch. 21)
17. Biogeochemical cycles (Ch. 22)

Part E – Communities and Ecosystem Functioning

Do we need all the species for ecosystems to function?

18. Species diversity and ecosystem stability: resistance & resilience (Ch. 19)
19. Species diversity and productivity: functional groups, redundancy (Ch. 16, Ch. 19)

Part F – Conservation of Communities and Ecosystems

How are human reshaping the natural world?

20. Biodiversity hotspots: endemism, threat, extinction risk (Ch. 27)
21. Habitat modification: land conversion, fragmentation, edge effects, corridors (Ch. 27)
22. Introduced species: predators, herbivores, competitors, pathogens (Ch. 27)
23. Effects of climate change on communities (Ch. 28)
24. Biodiversity, environment, economy and society: ecosystem services (Ch. 28)