

Bio 3SS Introductory material

Overview

1 Course structure

Course overview

- Lecture notes for each section will be available on AtL the evening before you need them
 - Check AtL frequently for announcements and new information
- The course co-ordinator is Marvin Gunderman
 - first contact for any administrative issues
 - `gundermn@mcmaster.ca`; LSB 116; x23556
- The professor is Jonathan Dushoff
 - Office hours MTh 11-12, or *by appointment*, LSB 332
 - `dushoff@mcmaster.ca`

Expectations of professor

- Start and end on time
- Focus on conceptual understanding
- Make clear what terminology and facts must be learned
- Open to questions – both in class (within reason) and at office hours
- Responsive to questions on class forums

Expectations of students

- Don't talk while other students are talking, or while I am responding to student questions
- If you must talk at other times, be unobtrusive
- Don't use the internet for non-class activities
- Give the professor his 50 min
- Lectures are required
- Tutorials are required, unless otherwise specified
 - If you don't go to tutorials, don't bother us about anything covered in tutorials

Texts

- The primary text for this course is the lecture notes
- You will be given readings, which will be posted to AtL
- You are required to have an Ecology textbook
 - Molles and Cahill, Second Canadian edition

Structure of presentation

- Required material will be clearly outlined in the notes
 - **Answer:** This is an answer: it was omitted from the notes for discussion purposes, you should probably write it in
 - *Comment:* This is a comment: I omitted from the notes because I thought it wasn't necessary for you to study. If you write it in, make a note to yourself that it's a comment.
- Required terminology will be presented in **bold**
- General ideas and approaches presented in class may also be required; you should take notes on these in your own words

Polling

- You can obtain extra credit by responding to in-class polls
 - Text from your cell phone, or answer on the web
- Why are you taking this class?

2 People

Dushoff

- Loves math
- Lived in four countries
- Studies evolution and spread of infectious diseases
 - HIV, rabies, ebola, influenza, ...
 - <http://lalashan.mcmaster.ca/theobio/DushoffLab/>
 - https://twitter.com/jd_mathbio

Students

- What year are you in?
- What kind of career are you aiming for?

3 Course content

3.1 Learning goals

- Ecology and population ecology
- Quantitative thinking
- Dynamical modeling

What is ecology?

- Poll
- My answer
 - **Answer:** The study of how organisms interact with each other and with the environment
 - **Answer:** Ecology is not environmentalism

What is population ecology?

- Poll
- My answer
 - **Answer:** The study of how organisms interact with each other and with the environment at the population scale
 - **Answer:** Larger spatial scale, longer temporal scale
 - **Answer:** We use models to link from the individual level to the population level

Dynamical modeling

- Investigates the links between local, short-term processes, and large-scale, long-term outcomes
- Allows us to explore what assumptions we're making, and how assumptions affect the link

Math

- Population ecology uses math
 - Math is a critical tool for linking processes to outcomes
 - Math will play a central role in the course
- We will keep it *simple*
 - But we understand that simple does not always mean easy
- Review the math supplement

Humans and abstract thought

- People are evolved to be concrete thinkers, not conceptual thinkers
- A goal of this course is to build conceptual thinking skills

3.2 Examples

Malaria

- A nasty, mosquito-borne disease
- In some places (e.g., the southeastern US), it has been eradicated almost by accident
 - Mosquitoes are still present
- In other places it persists at high levels despite concerted efforts at elimination
- *What factors determine when and where malaria spreads?*

Red squirrels

- Red squirrels are rapidly disappearing from England
 - Loss of suitable habitat?
 - Competition from gray squirrels introduced from North America?
 - * Diseases carried by gray squirrels?
 - Some combination?
- http://en.wikipedia.org/wiki/Eastern_grey_squirrels_in_Europe

Cod fisheries

- The cod is a culturally and economically important ocean fish
- It was believed for a long time that cod fisheries were too big for human fishing to have a substantial impact
- *Comment:* See link in notes
- http://en.wikipedia.org/wiki/Collapse_of_the_Atlantic_northwest_cod_fishery

Populations

- What population of organisms interests you?

Dandelions

- Start with one dandelion; it produces 100 seeds, of which only 4% survive to reproduce.
 - How many dandelions after 3 years?
 - * Answer: 64?
 - * Answer: 125?