

Outline

Course structure

People

Course content

Learning goals

Examples

Course overview

- ▶ Lecture notes for each section will be available the afternoon before you need them
 - ▶ Check AtL frequently for announcements and new information
 - ▶ All info will also be on the course resource page
 - ▶ <http://bio3ss.github.io/>
- ▶ The professor is Jonathan Dushoff
 - ▶ Office hours Tue 9:30-10:20 AM, Wed 2:30-3:20 PM, or *by appointment*, LSB 332
 - ▶ dushoff@mcmaster.ca
- ▶ The lecture TA is Caroline Cauret
 - ▶ Contact through the Facebook group, or AtL

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 (Facebook and AtL)

Expectations of students

- ▶ Start and end on time
- ▶ 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
- ▶ Attend the lecture, and the mandatory 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 is recommended
 - ▶ If you would like to use a different textbook, let your TA know, so we can attempt to provide readings.

Structure of presentation

- ▶ Required material will be clearly outlined in the notes
 - ▶ * This is an answer: it was omitted from the notes for discussion purposes, you should probably write it in
 - ▶ *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

Taking notes

- ▶ You will do best if you take notes
 - ▶ You should know by now what works for you
 - ▶ Or else that you need to keep working on it
- ▶ If a new concept is making sense to you right now, write something that will help you remember
- ▶ If there's something specific I think you all need to write down, I will write it for you (or mark it as an answer)

Polling

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- ▶ Outdated poll!: Why are you taking this class?

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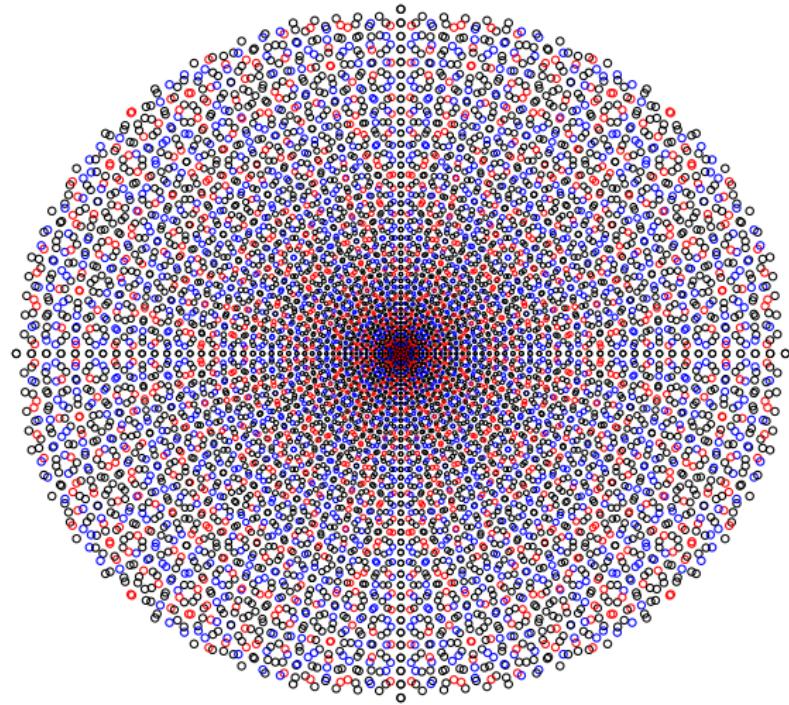
Learning goals

Examples

Dushoff

- ▶ Loves math
- ▶ Lived in four countries
- ▶ Studies evolution and spread of infectious diseases
 - ▶ HIV, rabies, ebola, influenza, ...
 - ▶ See notes for more info.

Pythagorean triples



Which country?



Which country?



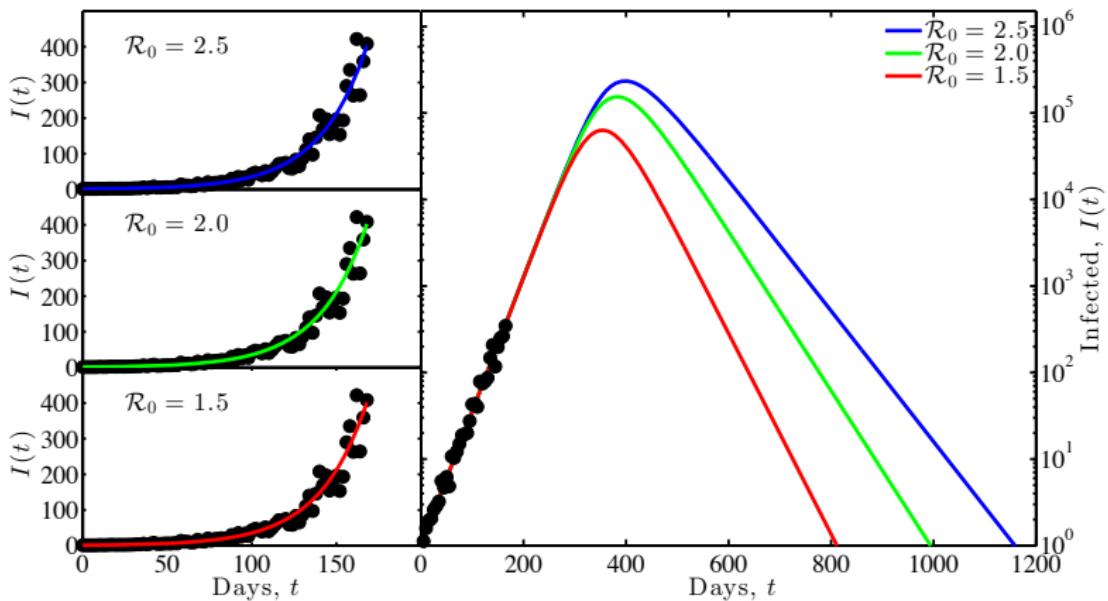
Which country?



Which country?



Ebola research



TAs

- ▶ Morgan Kain
 - ▶ Talks to angels
 - ▶ Walks down the street

- ▶ Michael Li
 - ▶ 23 acquittals
 - ▶ 0 convictions



Students

- ▶ Outdated poll!: What year are you in?
- ▶ Outdated poll!: What kind of career are you aiming for?

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Learning goals

- ▶ Ecology and population ecology
- ▶ Quantitative thinking
- ▶ Dynamical modeling

- ▶ Outdated poll!!: What is ecology?
- ▶ My answer
 - ▶ * The study of how organisms interact with each other and with the environment
 - ▶ * Ecology is not environmentalism

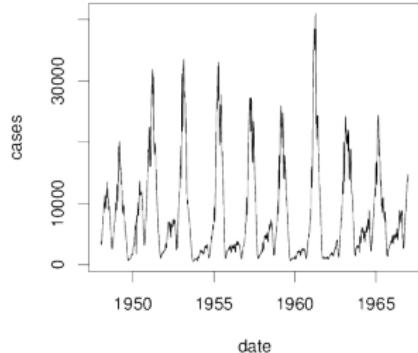
- ▶ Outdated poll!!: What is population ecology?
- ▶ My answer
 - ▶ * The study of how organisms interact with each other and with the environment at the population scale
 - ▶ * Larger spatial scale, longer temporal scale
 - ▶ * We use *dynamical models* to link from the individual level to the population 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



Measles reports from England and Wales



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



value

$$E = mc^2$$

units

$$c^2 = 89,875,517,873,681,800 \text{ m}^2/\text{s}^2$$

J | kg | 299,792,458 m/s

$$c^2 = 89,875,517,873,681,800 \text{ m}^2/\text{s}^2$$

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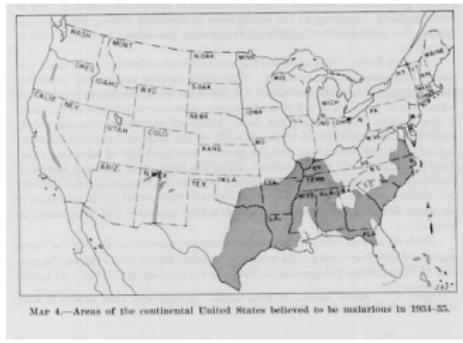
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Malaria

- ▶ 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?*



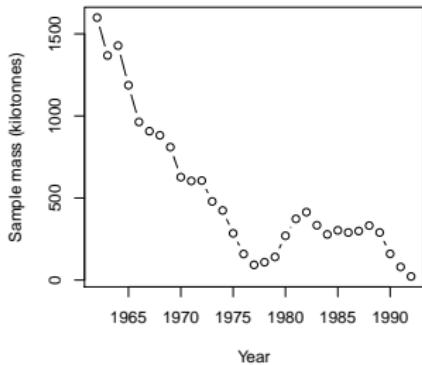
Red squirrels

- ▶ Red squirrels are rapidly disappearing from England
 - ▶ Loss of suitable habitat?
 - ▶ Competition from gray squirrels introduced from North America?
 - ▶ Diseases carried by gray squirrels?



Cod fisheries

- ▶ Is the ocean too big for people to affect?
- ▶ What happened to the cod?



Populations

- ▶ Outdated poll!: What population of organisms interests you?

Dandelions

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

