Course Syllabus

BIEB148: Disease Ecology

Noah Rose – Assistant Professor, EBE

Office Hours: Monday 10:30-11:30, Muir Biology 1114

TA: Brandi Sanchez

Description:

Infectious diseases have devastating consequences, but vary tremendously in their attributes. We will take an ecological approach, grounded in the species interactions and environmental context underlying disease transmission, to understand this variation. Why do some diseases explode in numbers, only to burn out and disappear, while others persist indefinitely? When and why do new diseases emerge in human populations? How does infectious disease affect plants and animals, and how can this inform conservation efforts? In this course, we will develop a conceptual framework and quantitative toolset for answering these and related questions. Together, we will discuss and develop strategies for understanding and managing the emergence and spread of disease on a changing planet.

Evaluation:

- Homework – 20%
- Paper/book discussion – 15%
- Attendance/participation – 5%
- Midterm exam – 25%
- Final exam – 35%

Learning outcomes:

- Learn how to apply ecological concepts to understand how diseases spread
- Work collaboratively to model and simulate disease transmission, and build intuition for why disease outbreaks differ
- Develop the ability to evaluate claims about disease origins and the logic behind different interventions and control strategies
- Engage with the primary literature to understand ongoing research in disease ecology
- Imagine future strategies to manage and combat disease spread

- Learn how environmental change can contribute to changing patterns of disease emergence and spread

Week 1: The ecological approach to disease

Week 2: Epidemics and modeling disease outbreaks

SIR models computational exercise

Week 3: Vector-borne disease

Week 4: Multiple hosts, macroparasites, plant and animal disease

Week 5: Disease control and vaccination

SIR models with vaccination computational exercise

Week 6: MIDTERM, seasonality and climate change

Week 7: Zoonoses, novel transmission cycles, and changing host ranges

Week 8: Disease ecology and conservation

Week 9: Phylodynamics and disease surveillance

Phylodynamics computational exercise

Week 10: Reflections and review

Beyond computational exercises, many weeks will include readings from the primary literature, book chapters, etc. Computational exercises will be carried out on personal computers with web-based tools.

Grading Scheme: Default Letter

Grade By Percentage

Letter Grade	Range
A+	100%to97%
A	< 97%to94%
A-	< 94%to90%
B+	< 90%to87%
B	< 87%to84%
B-	< 84%to80%

Letter Grade	Range
C+	< 80%to77%
C	< 77%to74%
C-	< 74%to70%
D	< 70%to60%
F	< 60%to0%