Exam: Population Ecology

Develop a 4-year long PhD project on the topic of: the effect of the pollinators on the population ecology of plants. There is some flexibility on how you design your question, which can exclude pollinators from plants experimentally or can focus on a examining the fitness of plants in different types of environments. While pollinators are known to affect plant reproduction (the number of seeds produced by plants), they can also influence other vital rates. For example, good pollination services might yield higher quality seeds that are better a germinating and becoming seedlings.

This project can be hypothetical (don’t get too distracted by picking the perfect plant species- you can instead think about what features you would be looking for in the ideal study system). I want to see that you understand the population models well enough to justify decisions you make in how you design your data collection and create your population model.

What are your study species and why did you choose them?

What is your specific question (keeping in mind that you only have 4 years to complete your PhD)?

How do you design your research to address your question? For example, will you work in the field or in a greenhouse/laboratory? What treatments will have? Will these be natural or experimental treatments? What will you measure?

How will you design your population model to test your question? I assume you will use a structured population model, as most plant and animal populations have some sort of age/stage/or size structure. Will you use a matrix population model or an integral projection model? Why? Will you incorporate environmental stochasticity or density dependence into your model? Explain and justify your choices.

Draw a hypothetical example of what results of your study might look like and interpret them.