BIOL 313 Course Profile

The course description for Biology 313 (**Principles of Ecology**) can be found here.

Generally offered in: Winter semester

Prerequisite(s): Completion of at least 24 units (four full-course equivalents), including Biology 233 or any two of Biology 231, 241 and 243.

Antirequisite(s): None

Interview with Dr. Kyla Flanagan

In your own words, can you give a brief summary about what this course is about?

This course gives a fundamental look at the principles of ecology. It starts off at the individual level then works its way up to the global level. We're looking at how interactions change as you move up in terms of complexity. **It's a great hands-on experience for students because they get to design their own research project.**

Students do a semester-long research project from scratch. They ask the question, develop hypotheses, go out and make measurements, analyze and report on the data. It is very cool to get that hands-on experience and not just another cook-book kind of lab. It's a bit different in that way.

What is the main skill you want students to take away from this course?

I want to foster an appreciation for nature. In lots of ways we become very isolated from the world around us and only focus on the species (i.e. humans) we are most interested in, but there are potentially 10 million other species that are very interesting. Being able to **broaden that perspective and develop an appreciation for nature** is super important in the current day we are living in.

If we are in a biodiversity crisis, you need people to care about the issue to take action. **If no one cares about biodiversity, then who cares about the crisis?** Or if we are in a climate change crisis, you need to know some ecosystem services that are provided by our world in order to appreciate that. That is my big goal in the lecture.

In lab, there are many important research skills. Inquiry, curiosity, experimental design skills which we touch on in BIOL 315 (Quantitative Biology) as well. Other things we work on are quantitative skills and writing skills, which are very important in this course. **Developing the ability to communicate scientifically is a central goal of this course.** In addition, collaboration is very important since it is team-based.

Another skill is data management; students manage large amounts of data, navigate Excel and learn basic quantitative competencies. Some students have no previous experience with this, while others may have past exposure to statistics. We try to create student groups that have at least one or two members that have previously taken a statistics course.

What aspect of the course do you think students struggle with the most?

There's definitely some **struggles around managing a semester-long project with five/six people.** It's an important life struggle to have; I still struggle in working in big teams on big things. We try to mitigate these struggles and help people establish strong collaborative skills, but it's not perfect.

People also struggle with the quantitative nature of ecology in many ways. Students may enter ecology thinking it's a "softer science," where we just watch animals or David Attenbrough videos (which we do), but that is not all ecology is. **Ecology is one of the most quantitative disciplines within biology and life sciences. This comes as a bit of a surprise to students.** There is lots of work with ecological models, parameters and variables. These are complex things that students may not expect when they join the course and they think, "what is this?"

Principles of Ecology is the first exposure to a university-level ecology class many students get. Much like other university courses, they may come in with previous ideas of what it will be like.

Exactly. **High school ecology often does a disservice to what students believe ecology is.** They cover nutrient cycles or very descriptive topics such as looking at how energy moves. It is often a very static presentation of what ecology is, but in university students see that it is a quantitative, dynamic system that we are trying to understand. That may come as a bit of a shocker. Some people may have even done a degree in the field before they think, "Oh, that's what it is!"

What can students do to be successful in this course besides attending lectures?

As with any course, **being very open minded to the whole process is very important.** When things are done differently, some students face resistance just because it's different. The labs in this course are quite different than many other labs and just **being open to the idea that this could be a great opportunity is a great mindset to come in with.** Approaching the class with the right framework is important to be successful in any class.

Does this course have a lab or tutorial component?

There is a very big lab component.

What should students expect from the laboratory component of the course?

Getting immersed in a particular research topic. **There are 4 research topics to choose from**: urban biodiversity, carbon forest sequestration, animal foraging behaviour and plant competition. Students get to focus in on a single question and explore that question very deeply. Going through the whole research process from start to finish is hopefully very exciting for students.

In addition, they can expect a lot of writing. **They will see that the labs are really scaffolded;** it may sound like a daunting thing to write a term paper on a semester-long project, but it is broken into little bits along

the way. You hand in and receive feedback on the Introduction, and then the Methods/Results to build up to this final project. There is lots of support for students along the way.

Many students feel uncomfortable or a bit anxious at the idea of group work for such a large portion of their course grade. What advice would you give these students?

Working in groups is hard, but the outcome can be so much better than what you would achieve on your own. Students don't necessarily appreciate this until they see how it can work really well. We have tried our best to structure the course so you are drawing on other people's assets. If you did try to tackle this on your own, it would just be an unmanageable thing.

Some students think that they don't want to trust their grade to somebody else, but relying on your teammates and allowing for collaboration is a very important step towards achieving the best outcome possible. Some people have to let go of a bit of control, while others need to step up to team expectations.

Having good chances for teams to get to know each other, understand each other and set up expectations is very important. There needs to be **conversations about how things will work and what will happen if a member doesn't fulfill their responsibility.** It takes bravery, too. Students are afraid to say things like, "you said you would have this done by today, what's going on?", but when you go into jobs, you need to have these conversations in order to perform.

As leaders and scientists in the future, you will probably be managing people. If you're not willing to have those hard conversations, things will not go well. You have to learn to not run away from every conflict that happens. You have to learn to address things in order to move forward; it is a hard skill to tackle problems that exist.

I was pleasantly surprised to find that the TAs are there to support you for team-building and conflict management. Allocating time for "team meetings" was built into the beginning of our lab time which really normalized the process of checking in with your group.

What's really eye opening is when you get to know and work with people, you see that they may not have done something because they have something major going on in their life. **There's an empathy that comes with getting to know people** and you no longer judge them as being lazy or not caring about their grades. This is important for life - you get to know people and know where they are at. I have seen very few situations where people are just lazy and not motivated; there is almost always something else going on.

That's what I love about the teams - you get to know people and support them. Then if you aren't at your 100% at every moment, others are there to support you as well. It is very cool to see that level of trust evolve for people. I know that **university can be an isolating experience. If you don't force yourself to talk to other people at times, it can be lonely.**

That is very true. Any team-based learning experience I've had has allowed me to make friends who I would otherwise not gotten a chance to meet. With the 4 types of research projects for this lab, are there any thoughts of changing them?

They have been the same for the past few years and there have been talks about just adding in a new topic or substituting out a topic. There have been some logistic challenges around that, but we are open to the idea.

What do you think is the most effective way that students can prepare for an examination in the course?

In Principles of Ecology, as with all of my courses, I tend to not focus on memorization. **Knowing basic terms and definitions forms the foundation of what we do, but assessment is at the applied level**. It is about taking what you know and applying it to a situation you haven't seen before. That can also be a shock to students. They may not have been taught that exact example or situation, but that's the *point*: taking your knowledge and generalizing it.

For assessment, understand the basic concepts really well but then thinking about different applications is crucial. **That comes through practice (exams, tophat, etc.) but also from doing the mental work and pushing yourself to think about different applications.** When I teach, I talk to students about **"Bloom's Hierarchy of Learning/Cognition."** This shows why those problems are a lot harder than definition problems. When we do Tophat questions, we stop and evaluate where the question lies in Bloom's taxonomy and what processes we need to do for the right answer. Many people assume mastery is memorization of all of the terms, but then they really struggle on the tests.

Are there other resources that students can use besides the textbook and lecture notes?

I won't be lecturing in the class next year as I will be coordinating the labs instead. But we do lots of Tophat questions, provide practice exams and I do a Google document with all kinds of practice questions. The textbook is also a great resource.

Do you have any other advice for incoming students taking BIOL 313?

Try and enjoy the material and get invested in why it matters to *you*. Try and make it personal and connect it to your life and experiences. **Have fun and be open minded!**

Do you have any stand-out memories while teaching this course?

There have been times where I trip and unplug the entire computer. Just me doing and saying silly things are memorable moments. It's a very fun class to teach and the case studies are a stand-out thing for me. The Hawk vs. Dove is a case study I made. It's great to see data emerge as we do the activity in class.

This interview transcript was edited for clarity and brevity.