BIOL 311 Course Profile

The course description and Fall 2018 syllabus of Biology 311, **Principles of Genetics**, can be found here.

Generally offered in: Fall and Spring semesters

Prerequisite(s): Any two of BIOL 231, 233, 241 and 243

Antirequisite(s): MDSC 341

Interview with Dr. Isabelle Barrette-Ng on November 8th, 2019

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

BIOL 311 is split into **two broad areas of focus**. The first being inheritance from both a classical and Mendelian perspective. We examine the relationships between alleles; dominant and recessive, autosomal and sex-linked. The second part is the molecular window into genetics, which takes place on the chromosomal level. We learn about the different ways mutations are created, and how species function differently on a molecular or chromosomal level. **The hard part about genetics is connecting the classical and molecular aspects, but it is also the fun part, as it allows us to understand why we see what we see.**

A smaller focus of the course is examining the environment and the role of epigenetics on phenotypes. This part of the course is very dynamic as there is new information coming in every year and is a very hot topic of research in the Biological Sciences. We try to understand where this data comes from and how it applies to projects like the Human Genome. In the last week of the course we examine the ethical aspects of genetics research. **Gene-editing technologies like CRISPR** have been all over the news for the last few years, so the question **"Just because we can, should we?"** becomes only more important as research progresses.

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

Problem-solving. Compared to other memorization-based biology courses that students have taken in the past (which are also very important), a lot of the questions we look at in 311 focus on extracting data from problems, trying to solve those problems and make a conclusion. Hopefully students will come out of this course with a proper understanding of how to "unpack" a genetics problem which will help them with future application-based biology courses.

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

Since the first half of the course is much more **math-based**, some students struggle with the abstract ratios and statistics that tie into the various inheritance patterns, which can be difficult to keep track of. In the second half of the course, it's a bit easier to reason through as there's less math. **However, there is more recall involved, so constant review is needed**.

Is there a lab or tutorial component of this course, and if so, could you explain what students should expect for that part of the course?

There is a laboratory component to this course. What we did when planning these labs was intentionally make a lot of **links between the material covered in lecture and the lab exercises**. We really wanted to give everyone a chance to have hands-on experience with the various techniques learned in class. Examples include setting up genetic crosses, PCR, gel electrophoresis, Southern blots and many more. A favourite of many of the students is when they get to **extract DNA from their own cheek cells**, and examine which alleles they possess for a certain non-coding gene.

Another thing we do in labs is students get the **chance to "unpack" difficult exam questions** that are covered in lecture with their TA. We find that students really benefit from these sessions as they get a chance to ask specific questions and clarify any confusion or misunderstanding they had from lecture.

Besides attending lectures and doing any readings, what can a student do to be successful in the exams and the course as a whole?

What I have found, and what the literature in biology education research says, is that **doing practice problems and giving yourself the time to develop good strategies** to approach and solve each problem will help students to succeed in this course. Doing all of that the night before the exam doesn't tend to be successful. It's a process that we all have to learn, as this course is when most students are faced with problems that they have to develop new strategies to solve. Figure out what is important and what isn't, and then use that information to draw conclusions and arrive at an answer. It takes time and practice!

What I also like to do is **make concept maps** with the students in lecture, to tie all the various concepts from the course together. Having those visual connections between different sets of material really allows your brain to compile and store all of it to a good extent. In fact, students have told me that **they still use their maps from 311 in 3rd and 4th year courses!**

Do you have any other advice for incoming students taking this class?

Don't be afraid to come to professors and ask for help. We really want to see you and help with any problems encountered, as that's how you can really fill in the gaps in your knowledge. **Everyone needs help in genetics, because it is so different to what students have encountered in the past**, so being resourceful and making use of your professors and TA's is a great way to stay on top of it.

Do you have any stand-out memories from your time teaching this course?

What I have observed in my years teaching this course is that every group is different. They all come with amazing and thoughtful questions; this is evident in both the lecture and lab components as they approach problems differently and really get engaged with the various exercises. This stands out to me every year, and is a big reason I love teaching this course!

This interview transcript was edited for clarity and brevity.