

## **BIOL 371 Course Profile**

The course description and Fall 2018 syllabus of Biology 371, **Comparative Biology of Plants & Animals**, can be [found here](#).

**Generally offered in:** Fall and Summer semesters

**Prerequisite(s):** BIOL 241 and BIOL 243

**Antirequisite(s):** None

*Interview with Dr. Douglas Syme*

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

BIOL 371 is called comparative biology of plants and animals. The term “comparative” is there intentionally; the course is for students to learn the basic biology of plants and animals. Where do we think they came from, what are some of the fundamental structures and just other interesting things about plants and animals. The idea is for students to have the fundamental material in order to take more advanced courses on plants and animals. But also for students that aren’t planning on taking any further courses, having students take away something useful by understanding the basic principles of plant and animal biology. **You learn more about what the different kinds of animals and plants you see in the world are and why they are present there.**

The comparative approach is so students come away from the course not thinking about plants and animals as separate, unrelated things. We want them to see plants and animals as two groups that share a lot in common. Because they are both big, multicellular eukaryotic organisms on the planet, they are doing many similar things. In many cases they do them in different ways, as there are many important differences between plants and animals.

We used to teach a course that was basically a half course about plants and a half course about animals. We changed it because we want students to come away from this course thinking more globally about plants and animals. Why are they doing the things they are, and built in their unique individual ways when they are doing much of the same things? Appreciate plants as multicellular organisms - they’re not just green things that sit there. They are doing all the same kinds of things that we do and it is important to appreciate them in that regard. Students learn a lot about animals in high school biology, but not a lot about plants. We want to see them as sophisticated, living things just as we are as animals.

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

I think the main skills an intellectual skill: having the fundamental understanding of plants and animals and integrating across groups of organisms and concepts. We try to enforce “don’t just remember this lecture” or “remember that lecture,” but carry information not only from lecture to lecture and topic to topic, but cross between different groups of organisms like plants and animals. **Think broadly**, so you do not just remember packets of information. Instead, see across topics and how they relate to one another. **In the grand scheme, every topic in biology is in some way related to other topics** - whether you’re a

biochemist or an ecologist, you deal with the same systems at different levels. So it is important to understand the different levels and how they integrate. This skill goes beyond just the material.

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

I think they struggle the most with just the **sheer amount of information**. The course is divided into “themes” which are big topics. With each of those themes, we talk about various aspects that are relevant to plants and relevant to animals. For example - homeostasis. How plants and animals achieve certain aspects of homeostasis and a comparison. In order to understand the big ideas, there are many details and examples that we give the students. That piles up into an awful lot of information as the course goes by.

Students struggle to know how much of that information is pertinent to remember, and they struggle to always find the relationships. We aren't giving you examples and details just to make you memorize details, it's to help you understand the bigger idea. I think that's the biggest fear and concern of students - all of this stuff that we talked about, do you have to know all this stuff? We tell them “yes,” but not because we just want you to memorize stuff, but because the more of that you remember and understand, the better you'll understand the bigger ideas. We think these things help you understand the topic. Having students appreciate that while there is a lot of information to memorize, that is not the key part. The key part is holding as much of it as you can in your head to better understand the biology we think is important. **You don't have to memorize every single detail to do well in the course.** No student can remember everything we tell them; know as much as you can, the more you know, the better you'll be. But you don't need to memorize it all to do well in the course. That is the biggest trepidation students have when they come to the exams. **Understand how it fits into the ideas,** don't memorize all the little details.

As students progress into higher courses they will see “ah, that's the importance of learning.” There's all kinds of information out there, but the key is *not* knowing it all. It is knowing as much as you can to help implement and understand.

### Is there a lab or tutorial component of this course?

There is a tutorial component, but it's not a typical tutorial session where you sit in a room and have somebody teach you the material. It's more a separate opportunity to learn. The **tutorials are computer-based** where we direct them to topics and papers to read and then we ask them a set of questions. It is essentially a quiz that is based on information not presented in the lectures. These are intended to broaden the student's comprehension beyond what we talked about in lecture, but also to **get them reading the literature**. Get them looking at what is written out there about topics in biology and how to go about understanding that.

How do you take information from something like a scientific manuscript and use it to understand biology? How do you know what to read in there and what do you actually think is right, or do you think some of it is wrong? To get a better sense that the textbooks you read in introductory biology are written as the gospel, like this is the “truth about biology.” But where does that information come from? It gives them a chance to look at the rawer, original sources of information to appreciate that it is a very complicated field. Coming up with this list of things in the textbook that we hold to be true is a very human process. It is not about “I did an experiment and here is the truth,” and here it goes into a book. It takes all kinds of

information and interpretation by people trying to figure out what they think is real and that's what makes it into the textbooks. So a chance to see more of the complexity about biology rather than the simplistic stuff you see in a textbook.

### Would you say the tutorials are more about gaining this skill than the information?

It is partly the information, but it is largely the skill of being able to look at somebody's experimental results and see how did they draw conclusions from that and how did they decide what is true and makes its way into textbooks. In the end, the hope is for them to realize that when they read a textbook that this is all somebody's interpretation. Some of it is very well supported, but a lot of it, if you look at a textbook from 50 years ago, might be wrong. From further information gathering, there is a new way we think about these things now. To see biology as a growing, evolving and human endeavour of having data and saying, "what do I think this all means?"

### What resources (textbook, lecture slides, tutorial assignments, labs) should students focus on when preparing for the examinations?

I would say the **number one thing is the lecture notes**. The lectures are *very* important. We provide students with a basic skeleton of our lecture notes to help them see the flow of the topics and how they relate, but we fill in a lot of the details in class. We say here's the bullet point, but here's the examples and detail that helps us understand that and why it's important. **So the lectures are very important for students to attend - it would be very difficult for a student to do well if they missed a lot of lectures.**

There is a textbook, and we try to provide pages and topics in the textbook that are relevant to the lecture, but it's not a great substitute for the lecture. The integrative way we teach the course is not done in any textbook. So we can direct them that "here is a chapter on plants that talks about some of the things" and "here is a chapter on animals that talks about some of the things," but they tend to take a different approach. Their approach is "these are plants and these are animals", while we are trying to bring those two together. **There is no textbook that is a good substitute for the lectures.** We use the same textbook that they use in Biology 241/243 so they don't have to go out and buy a new textbook.

In terms of the tutorials, the resources are manuscripts and things that are provided to them that they have access to through the U of C library. There are no additional things that we ask them to have, and that was our intention when designing the course. We know students in second year have a tough year for biology. It's a really hard year with a heavy course load. We wanted to make a course that wasn't overwhelming in terms of labs and lab reports and those sorts of things and it wasn't going to make them go out and spend a fortune on other resources.

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

My advice for incoming students would be that our intention in the course is to teach you the fundamental principles of plants and animals, so you can go further if you want to, but also to try and impress on you that **plants and animals are actually very neat things**. Animals are more than dogs and cats and cows and chickens, and plants are more than just green things that sit on your lawn. They're fascinating things,

and in many ways doing really neat things. Approach the course in that way - with the spirit that it was intended to teach you important things, but also to impress on you that these are really neat organisms.

### **Do you have any funny memories or anything that has stuck out to you from your time teaching this course?**

The funniest thing about this course, although maybe it is more annoying than funny, was that it is the only course I've ever taught where on multiple occasions, exam rooms have been double booked. We show up to write an exam and somebody else is booked in. That's never happened in any other course, but it's happened to me three times now in this course.

### **So what did you do?**

That's the question. We have been fortunate that there have been other rooms. You call security and say "where are we supposed to go? I have 400 students standing here and an exam that starts in 20 minutes." We've been fortunate that there have been other rooms around that we have been able to shuffle into. It makes it very awkward and very difficult for us and the students, but we've been lucky that we haven't had to say the exam is cancelled and we have to reschedule another exam. That is the oddest thing about this - not only does it happen, but it's happened several times.

### **When is the last time it happened?**

Last year. The first time it happened was the first year we taught the course.

### **How long has this course been running?**

It's been running for 6 years now. The first time it was offered was in 2013. About 8 years ago, the department reinvented the core courses. It looked at the way courses were taught and thought we could do a better job. We recreated a number of core courses; Biology 241 and 243 were newly created. In the process, the plant and animal content as a dedicated topic disappeared from the core courses, and they became more conceptual courses dealing with important principles of biology, but not dealing with plants and animals specifically. We created Biology 371 that dealt specifically with organisms after the core courses were remade, so it's been around for about 6 years.

*This interview transcript was edited for clarity and brevity.*