CMMB 443 Course Profile

The course description for CMMB 443 (**Microbial Physiology**) can be found here.

Generally offered in: Fall semester

Prerequisite(s): Cellular, Molecular, and Microbial Biology 343 and Biochemistry 341 or 393

Antirequisite(s): N/A

Interview with Dr. Lisa Gieg

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

This course is called microbial physiology, and I tell students that it is really **a course about how microorganisms work** - that is really what we are learning about. We learn what these organisms are made out of, how they transport compounds across their membranes, how they cause infection, how they move, how they respond to external signals, and how they metabolize various compounds. We also have a **whole section on different types of anaerobic microorganisms** as well, and how those influence the nitrogen, sulfur, and carbon cycles. In essence, the course is about how microbes work.

I also try to bring in different concepts about **how the course material is relevant to society**. This involves industrial or medical uses, or biotech and environmental applications. In this course, students are not just learning bits and pieces of information, but instead, they are getting a glimpse of *why* we care about how microbes work, or rather why we *should* care about how microbes work.

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

Ultimately, what I would like students to take away from this course is **an appreciation for the importance of microorganisms within the broader context of the Earth**. We learn a lot about the details of different functions and parts of microorganisms in this course, but really, I want people to remember how important microorganisms are to our planet, to humans etc. Appreciate the small things!

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

I believe **students struggle mostly with the metabolism section** in trying to learn all of the metabolic pathways. We do cover some pathways that many other courses cover, including glycolysis and the TCA cycle, but in the microbial world, there are many pathways specific only to microorganisms, so I think a lot of the information covered in this section is new to everybody. **Seeing the bigger picture of metabolism** is what a lot of students struggle with.

Within the metabolism section, what level of understanding is expected of students?

Metabolism really comes down to a series of reactions. We want to understand what the microorganisms are trying to do by running a specific series of reactions, and what the microbes get out of these reactions. I do make students memorize some specific enzymes, and where they are important or critical in certain pathways, but generally, we focus on **more of a higher-level appreciation of why an organism is running a series of reactions**.

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

I think it is helpful for students to **review their notes** after every class, or at the end of each week to evaluate their retention of the material, and to determine if they have any gaps in their understanding. I also give students **study questions before each exam** which really guides students through the notes, as the concepts highlighted on the study guide are very likely to be on the exam. If students have a strong understanding of the concepts and the answers to the study guide questions, then they should do quite well.

Does this course have a lab or tutorial component? If so, what should students expect from that component of the course?

This course has a lab component, but no tutorial. The number of labs has ranged from **three to six per semester**. I think the lab component is another area where students can struggle in this course. Students can **expect these lab reports to be more comprehensive** than they may have written in previous biology courses. At this level, students are no longer getting one page worksheets to fill in - they are actually writing full lab reports themselves.

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

From my point of view, the **study questions** that I have previously mentioned are an effective way to prepare for exams in this course. I am more than happy to meet with students to discuss and clarify any outstanding questions they may have about the material. I think that **discussing key ideas with me** can be another method that could be quite useful for students.

Aside from the textbook and lecture notes, are there any other resources that you recommend students use?

We no longer have a required textbook for this course. **Everything that students need to know is in the lecture notes**. If there is a particular article that I suggest they may read, I do point them out in my lectures, however this material is not tested on exams. I also **dedicate some class time to practice questions**, especially in the metabolism section. This is an attempt to not memorize the pathways, but to ask and work through applied questions about what these pathways are doing. I give students time to try to answer these questions, and then we walk through the answers as a class.

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

Students that come into the course have taken the introductory microbiology course (CMMB 343), and I **strongly suggest that students keep their textbook**, because it remains relevant, and is a good resource to read more in depth about topics. Compared to CMMB 343, this course goes into more depth, however, a lot of the topics covered in CMMB 343 are still very applicable, so I encourage students to never get rid of the CMMB 343 textbook if they are going to do anything in microbiology.

In terms of coming in and being successful, because I have also taught CMMB 343 in the past, I know what the level of learning in that course is, and I know that I am building on that. **I make an effort to draw connections from CMMB 343**, and to help students recognize that they already know a little bit about some of these topics and that now we are going to go into more detail.

What is your favourite part about teaching this course?

My favourite part is doing my best to relay to the students **the relevance of microorganisms in the world**, and while we do have to go through lots of details and they have to learn some detailed facts, again, we are getting an overall appreciation for how important microorganisms are and the various mechanisms they have to survive as the most abundant creatures on the planet. **Having students ask me questions**, even when I cannot answer them, and seeing the class engagement is something I also really enjoy. I have learned over covid that I definitely prefer being in person in the classroom in front of real students!

This interview transcript was edited for clarity and brevity