

**ANDREW ROBINSON:** My name is Andrew Robinson. I teach physics at the elementary level at Carleton University, and welcome to my online classroom.

So here I am. I've actually got the in video thing switched on at the moment. I don't usually use it, but I thought you might just like to put a face to the voice for a few moments. This does increase the storage requirements quite enormously, which is one reason I don't do it.

So what is the course that I'm talking about today? It's Physics 1007 Elementary University Physics 1. It's an algebra-based course. It's usually taken by people doing a science degree, which is not honors physics or engineering. So it's taken by people in the life sciences, neurosciences, and so on.

It has a laboratory component worth about 30% of the final grade. I will not be talking about that because moving that to online was the responsibility of our lab coordination staff.

So, first, let's talk about who are the students who usually enroll in this summer course. Remember it's a summer course, so it's compressed. It's only May and June, so we-- effectively, we have seven teaching weeks and then one week for exams.

So one characteristic that we found is they are usually experienced learners. They've all had at least one year of university, and sometimes they are actually about to graduate. And that means in the regular course, I can actually push them pretty hard because they know how to learn, and they can absorb information at a great rate and process it and be able to solve problems to a satisfactory level. They are well-motivated students-- some of them because they need to take this course to be able to graduate and some of them because they need to take the course to get into medical school or veterinary sciences.

One characteristic that is very common is they are often very anxious about physics. They probably haven't taken physics since high school, and sometimes they even didn't take grade 11 and 12 physics. And so one of the first things I have to do is overcome that anxiety. It turns out that they can all do physics. It's just they don't think they can when they start. And so that's one of my prime motivators is to get

people in the right mindset to actually believe that they can learn.

The typical enrollment is around 110 to 120. We actually had 200 enroll for the course this year. We are now down to 170 just before the final exam. I kind of expected some attrition like that during the course of this-- during the course of the summer.

So, normally, when the summer course is done, it is done in three-hour lectures, two three-hour lectures a week and a three-hour lab. It always used to be done in the evening, 6:00 until 9:00, which was terrible for me as well as for the students, I think. I just managed to get this changed to 2 o'clock until 5 o'clock this year when the coronavirus came along. And so we've had to move completely online, of course.

And so the good thing, from my point of view, is that I was familiar with most of the technology that we needed to use because I always recorded the lectures anyway so that people could review them. And a significant number of the class actually didn't attend the actual lectures. They just used the online recordings anyway.

I was also used to recording short worked problems through PowerPoint and uploading to the Carleton media server, usually no more than about 10 minutes or so of length of these problems. And, of course, that's an absolutely ideal format if you're going to deliver the course in an asymmetric fashion.

So I actually was not too worried about moving everything online. It was the time it was going to take, not getting to grasp with new technology. I also did lots of quizzes in CuLearn, and I have experience of uploading written work in CuLearn as well.

In my normal class, I would use clickers, PollEverywhere. Obviously, that is not quite as convenient. So I needed something to allow for a participation grade. And for that, I've introduced short low-stakes testing, which are basically participation only, to take the place of the clicker, the think-pair-share type of activity that would go on if we were in the classroom.

So my objectives when moving online were to provide some structure for the students. So there have to be some deadlines because we've only got seven weeks to do everything. And if you want work graded, then a TA has to grade it, and you have to make sure that the TA gets work at a reasonable flow rate so that they're

not overwhelmed right at the end with everybody handing things in.

We also want some timetable of expected progress. So if I put written assignments once a week, then students get the idea that they should be studying this material for this particular week.

I did very much from the first-- from the offset emphasize flexibility, that the deadlines were not immutable. They could be freely extended on request. All people had to do was email me. They didn't have to tell me the reasons. All they had to do was say, can I have an extension? And they would get the extension.

I also decided, because of the uncertainty about the lockdown, that the best mode of trying to give the material would be asynchronously so that people could tailor their own particular study to whatever was going on in the rest of their lives and wherever they were locked down.

Of course, the key thing is to make sure that there's plenty of support for students. So I have sets of work problems, which were already available from previous years. I have practice problems with low-stakes testing, as I mentioned earlier. Those are CuLearn quizzes. I have a discussion forum on CuLearn, which was actually used much more frequently than it is in normal years.

And I decided to have regular office hours with BigBlueButton daily at the same time, so it was always at a fixed time. That had to be arranged with my own particular household requirements as well because my older son was actually finishing his grade 12 education, and so I wanted to synchronize my regular office hours to make sure that it wasn't overlapping any time he was in a video call as well.

So what work did I need to do? Well, I had existing PowerPoint presentations. So they needed regrouping and chopping up. So I grouped my topic into modules, which had either one or two chapters in the textbook, and I actually used the opportunity to reorganize the flow of material differently. Physics elementary textbooks are very conservative, and they are basically all organized the same way. And it's actually pedagogically not always the best way to teach things.

Then I broke down the modules, the topic, into units, which were lecture recordings

no more than 15 to 20 minutes. And I'm really working now on shortening that even down to 10 to 15 minutes. I had to write lots of extra quiz questions for the low-stakes testing and the interactive-- to replace the interactive clicker questions. And so there was a considerable amount of work to do, but I had all of the basic material already on hand.

And so, finally, written assignments are worth 15%. The checkpoint quizzes, the participation, 5% if you participate in 80%. And it's prorated if you participate in less than 80%. Online module quizzes, 25%. Again, drop 2 of the 11 quizzes. Final online exam, which is basically a very large online version of the online quizzes, that's worth 25%. It's a summative exam. And the lab, 30%. Four out of five lab grades.

So I hope that gives you an idea of how I balance the various course components and given you some ideas as to my design philosophy. So thank you for joining me, and I hope that was useful for you.