



Remote Teaching Modules

<https://www.simiode.org/modules>

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The following questions were posed by attendees at our Webinar on 13 August 2020. Please direct additional questions or comments to Director@simiode.org.

Q0: How can we access the remote teaching documents?

(Panelists gave a demonstration of the click-throughs needed.)

Log in to SIMIODE (<https://www.simiode.org/>); if you are an instructor who is new to SIMIODE, register for a free membership (**Register Free**). We require membership to ensure that materials that are designed for teachers are available only to teachers, as well as to reduce harmful “bot” damage. All SIMIODE materials are available to registered teachers.

The image shows two side-by-side screenshots of the SIMIODE website. Both screenshots are for the page titled "Remote Teaching Module - Modeling a Nonlethal Influenza Epidemic" by Brian Winkel. The left screenshot shows the "About" tab selected, displaying the category "General Resources" and the publication date "20 Jun 2020". The right screenshot shows the "Supporting Docs" tab selected, displaying a list of four downloadable files: "Module-Epidemic.pdf" (2.42 MB), "Module-Epidemic.TEX" (30.29 KB), "Module-Class-Epidemic.pdf" (1.29 MB), and "Module-Class-Epidemic.TEX" (26.83 KB).

Here is a snapshot of one of our [Remote Teaching Modules](#). You can see multiple tabs: About, Supporting Docs, Citations, Questions. “About” gives you an overview. You can download the materials to adapt for your own use within the “Supporting Docs” tab.

Q1: Are the remote teaching documents ADA compliant?

We use common formats (such as pdf) and make source available if you need to adapt for a specific need. All the student videos have closed captions through YouTube. For the visually impaired, the documents are readable or can be accessed with a reader.

Acknowledgement: Accessibility is super important for diversity, inclusion, and equity. Some college disability offices can work with the electronic form of all slides and handouts as a first step to fully move to ADA compliance with available readers for blind students. Some colleges want compliance even if we do not have a student who needs it. Some colleges require the faculty member to provide accommodations. Faculty have

been conversing about compliance issues through the MAA Connect discussion forum for the Mathematical Association of America.

SIMIODE is working with the Science Gateways Community Institute ([SGCI](#)) and will continue efforts to enhance accessibility of its materials.

We welcome your feedback on the accessibility of the SIMIODE website.

Q2: How flexible are the materials?

Is all of the “lecturing” by online video? Is it all looked at outside of “class time”?

Do you have students work on these scenarios individually or in small groups?

Especially during this pandemic, we recognize the multitude of modalities in which courses are being delivered: in-person but with masks and physical distance, having some students join remotely, fully remote and synchronous, mostly asynchronous, etc. We have developed these materials to be adaptable for your individual teaching style. We have provided the source materials.

We have also included suggestions to the instructor for implementing the activities. For instance, for the Car Suspension model, the instructor may cover the background material themselves or can assign the two-part video activity with low-stakes assessment questions, collect the questions for grading, and provide the video with the answers for the background questions. Most likely, this background material will be assigned outside of class, but it could also be used in class to give a review or overview of second order linear homogeneous ordinary differential equations with constant coefficients. The instructor assigns the text document for the Student Version of the modeling activity but may also assign the two-part video.

Students can work together, even if it is remotely, and collaborate in a Google Doc or Google Sheet, for instance. Their work can be shared within their small group and with the instructor. Students could be asked to create a short video to present their materials to the rest of the class. There are many ways that students can be engaged.

Q3: They are great projects for DE. But is it possible to adopt some project in Calculus I or II class? to high school students? Or any upcoming calculus-based modeling student?

Some of these materials may certainly be used in a calculus sequence. Indeed, just about all of our first order differential equations models can be used as applications of antidifferentiation, some immediate and others using separation of variables or integrating factor techniques.

We celebrate the expanded variety of ways that Calculus and other courses are taught and recognize that “traditional” applies less and less. For instance, the Introduction to Modeling module that generates data the Common Cold and the Separation of Variables module that uses Ebola data will be accessible to students with some background in Calculus and working with spreadsheets. The remote teaching materials for the latter include an overview of partial fractions decomposition as a prelude.

Q3a: In the separation of variables module, students can apply what they learned with the Ebola data to data for a particular state, or for different states, to the COVID-19 data. **How do the students get the data from the CDC? Since the current political trend is not necessary to update, are there other places that students can get their state's data?**

See <https://covidtracking.com/data/download> or <https://github.com/nytimes/covid-19-data>.

Q4: How do you balance the overall workload for students? If they are spending significant extra time on modeling projects, do you tend to assign less homework or skip some "standard" topics that might otherwise be covered?

This involves the weighty topic of covering a syllabus, balancing skills and solution techniques with a modeling mentality, etc. Students retain content better when they are motivated and understand why they need it. Teaching with a modeling-first approach covers both of these bases. First, consider your overarching goals for the course and which topics are essential for these goals. The quality of learning students get has a more lasting impact than the quantity of it. Second, activities and projects can be an effective way to teach “standard” topics, as students learn by doing. Homework can be aligned with or partially replaced by project/activity work. In the Teaching Guide for each module, there is (one or more) implementation schedules along with a discussion of how it fits alongside or replaces standard topics.

We might also think about multiple ways of evaluating students. Especially given the added stress for both faculty and students during the pandemic, we might assign more low-stakes assessments than relying heavily on exams. Also, assessing students through projects and other essay/report-form assignments is less prone to cheating than assessment through a standard question/answer exam.

We add that often delving deeper into the mathematics which modeling necessitates gives students a firmer grasp and better retention on the materials covered. Moreover, the curiosity that is natural in all of us pulls us along in both model and mathematics so we can cover comparable material as well as offer meaningful and transferable to cognate courses notions and detail.

Indeed, Karen Bliss and Jessica Libertini have demonstrated in their applied mathematics course for engineering students at Virginia Military Institute that the introduction of modeling enhances the learning of the mathematics and facilitates more in depth coverage. See Bliss, K. and J. Libertini. Using Applications to Motivate the Learning of Differential Equations. In *Advances in the Mathematical Sciences: Research from the 2015 Association for Women in Mathematics Symposium*. Weisbaden GERMANY: Springer International Publishers.

Q5: How do we prepare students to be involved in modeling?

Our modeling materials are a great resource for engaging students in modeling, even if they have never modeled before.

One way is to ease them in while engaging their curiosity as to how mathematics can play a role WITHOUT actually doing or completing the mathematics - just pull back the curtain or list off areas of applications for which you can find many in SIMIODE and elsewhere.

We also have a [Starter Kit](#) in SIMIODE which can help both teacher and student to ease in to using modeling to learn differential equations.

Additionally, we offer [SCUDEM](https://www.simiode.org/scudem) (<https://www.simiode.org/scudem>)-- the student challenge using differential equations modeling in which a team of students works on problem solving with modeling. Volunteer as a coach and pick your team of students, though of course let the students work on the problem themselves. Volunteer as a judge to give positive feedback to teams.