



Student Challenge Using Differential Equations Modeling
Intermountain Section of the Mathematical Association of America
SCUDEM Lite Problem

Student Team Challenge: Using Derivative Action Modeling

For release 1 minute after midnight or 0001 hour, 18 March 2020

You are to prepare a 10 minute presentation for submission.

The rules for conducting the challenge including roles for student team members (from high school or undergraduate level) and coaches/mentors can be found at <https://www.simiode.org/maa-section-modeling>. Teams are to upload a 10 minute video presentation, for judging and feedback to YouTube as **UNLISTED** NOT as private and send the YouTube link, for judging and feedback to **Director@simiode.org** no later than Midnight EDT on Saturday 28 March 2020. We ask that each video presentation have clear identification of (a) student team members, (b) faculty coach/mentor, and (c) full school name and city, state, country location IN the presentation and in any description posted with the presentation as well as the email to the Director..

STATEMENT OF PROBLEM AND SOME REFERENCES

While this student challenge is affectionately called “SIMIODE Lite” the subject matter of this problem is anything but “Lite.” It is serious, it is in the news, it deserves attention and preparation, and it merits analysis and reflection. Through this activity we hope to educate and inform, as well as foster application of the mathematics of change (differential equations), in order to understand some aspect of the coronavirus.

You are to select some aspect of the current discussions and activities surrounding the coronavirus the world is facing and then create and build a mathematical model involving variable(s) and how they are changing by incorporating assumptions, data, information, and facts as we know them, into this model.

You are to analyze this model in terms of what it represents and may predict as well as discuss how sensitive change in assumptions or more up to date data or information might reflect themselves in your model. ANY aspect of issues surrounding the current activities of the coronavirus may be considered, e.g., health, education, economic, geopolitical, for modeling.

It is the intention that you select one aspect surrounding the coronavirus and not try to do it all, but perhaps relate other aspects to your study as appropriate and as you are able.

While references, articles, reports, opinion pieces, and pronouncements about this issue abound, we provide just a few of the current (as of this writing) references you might consider. One key to success in modeling is to make prudent, relevant, and reasonable assumptions and base them on the facts as we know them. Thus, you are charged with basing your model on the best factually correct information available, building your model, explaining your analysis, and examining your results in terms of sensitivity to change in assumptions, data, and parameter/variable interactions.

ADVISORY: Because of the current nature of the coronavirus some individuals may be uncomfortable in studying this outbreak. Therefore, we support your study of past situations with the same modeling expectations (i.e. contributing your own model), but bringing these conclusions to apply to the coronavirus in at least one context.

Some Coronavirus Resources for SIMIODE Lite Problem.
As of 1 March 2020

General information and major World Health Organization web and data site
<https://extranet.who.int/publicemergency> and
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>

Centers for Disease Control and Prevention - United States Government
<https://www.cdc.gov/coronavirus/2019-ncov/index.html>

More data information
<https://www.worldometers.info/coronavirus/>

Coronavirus Live Updates: Clusters in Japan May Hint at How Virus Spreads
<https://www.nytimes.com/2020/02/20/world/asia/china-coronavirus.html?action=click&module=Top%20Stories&pgtype=Homepage>

Perhaps just concentrate on infections for healthcare workers
<https://www.nytimes.com/2020/02/21/world/asia/china-coronavirus.html>

Coronavirus Live Updates: More Confusion as China Changes Counting Method Yet Again
<https://www.nytimes.com/2020/02/21/world/asia/china-coronavirus.html?action=click&module=Top%20Stories&pgtype=Homepage>

Hundreds Released From Diamond Princess Cruise Ship in Japan
<https://www.nytimes.com/2020/02/19/world/asia/japan-cruise-ship-coronavirus.html>

Tulane math professor leads effort to map spread of coronavirus
<https://www.fox8live.com/2020/02/18/tulane-math-professor-leads-effort-map-spread-coronavirus/>

Dangerous Numbers? Teaching About Data and Statistics Using the Coronavirus Outbreak
<https://www.nytimes.com/2020/02/27/learning/dangerous-numbers-teaching-about-data-and-statistics-using-the-coronavirus-outbreak.html>

How epidemics like covid-19 end (and how to end them faster)
<https://www.washingtonpost.com/graphics/2020/health/coronavirus-how-epidemics-spread-and-end/>