

Brief Teaching Guide
Teaching Module - Applying Separation of Variables
Patrice Tiffany, Manhattan College, Riverdale NY USA

Brief Teaching Guide: (1) (this page)

This is a brief guide on how to use this module in transitioning to remote learning. After reading this you might want to view the **video in file 8 first**.

Warm Up:

Assign: (2) Find a map of Sierra Leone, Liberia and Guinea. Submit a copy or a sketch of the map and write a short paragraph giving information on each country. Include whatever facts you find interesting.

Need to know:

Remind students: Review implicit differentiation, inflection points, and second derivative. Review integration with partial fractions.

Assign: (3) Review sheet: Integration with partial fractions

Assign: View video: <https://www.khanacademy.org/math/ap-calculus-bc/bc-differential-equations-new/bc-7-9/v/modeling-population-with-differential-equations>

This leads right into the next video:

<https://www.khanacademy.org/math/ap-calculus-bc/bc-differential-equations-new/bc-7-9/v/logistic-differential-equation-intuition>

Where did exponential growth function come from?

Where did limited growth logistic equation come from? (Verhulst)

Modeling Scenario:

EBOLA Outbreak in West Africa (Lisa Driskell) (#1-038-Ebola-Modeling Scenario on SIMIODE site) This may be tweaked accordingly. I changed the names of the unknowns. This is done over two fifty minute class periods.

Teacher's tweaked version (4)

Student's tweaked version (5)

Student scenario worksheet part one (6)

Student scenario worksheet part two (7)

These worksheets (developed by Lisa Driskell) give the original scenario more structure and might be better to use for remote learning. There are a few questions left out from the original scenario.

Teacher Video: (8) on how to implement this scenario in a remote learning mode

You may also view this at:

File (9) Power point file of the teacher this video: 8_Teacher_Video

Assign: (10) View technique video: 10_Student_Video_for_technique_sep_of_var

Technique: How to solve first order differential equations using Separation of Variables.

Assign: Do examples on separation of variables (from your text) after the first day of the module. This is due by the second day.

Assessment:

Project: (11) Write up a report on how to model the reported cases of those infected by the COVID virus in one state in the United States. Each student picks a different state. Have them clearly illustrate the method of separation of variables in their report. Have them graph their model vs. the data. How accurate is your model?

Try to find a graph or data showing the original predictions for that state. How accurate was the prediction?

General Rubric: (12) provided.

Quiz: Give quiz on separation of variables technique. This would be after the project is handed in.

Wrap Up: Share graphs from the projects. Discuss models, predictions and data. Compare models of different states.