Interdisciplinarity at the service of society: Interpreting the evolution of COVID-19

Enlightening Interdisciplinarity in STEM for Teaching

2nd interdisciplinary line of inquiry

The role of mathematical models in studying the evolution of the pandemic

INTRODUCTION

The emergence of the COVID-19 pandemic has put the scientific community in the spotlight of society as a whole. Their studies have been one of the main tools for establishing measures to address the situation and have had a direct impact on daily life. Good examples are *statistical analyses* to extract relevant information from data, the development of *mathematical models* to make predictions, and *computational simulations* to understand virus diffusion.

In this second submodule we will focus on the second topic: **modelling to make predictions**. Based on the evolution of the number of COVID-19 infections accumulated in Spain during the first wave, we propose that you model these data with the goal to make predictions for the days following the first wave.

The generative question of the module that will guide your investigation as students in this interdisciplinary line is the following:

What is the role of models and modelling in investigating the evolution of COVID-19?

PART 1: Presentation of the interdisciplinary line of research

To get started, we suggest you answer these questions in order to define a little bit the task proposed:

What does it mean to model some data?

What is a model? What is a "good" model? What would be a "good" model for understanding the evolution of COVID-19?

What can be the goals of modeling some data? That is, what do we intend to study when modeling the actual data on the evolution of COVID-19?

PART 2: Research development

Once you have discussed the questions, we ask you to propose, in groups, a "good" model to understand the evolution of COVID-19. Specifically, we propose that you **model the cumulative number of infected people during the first wave to make predictions** for the following five days.

To do so, you have at your disposal the *First_Wave_Data* file (https://identitiesproject.eu/wp-content/uploads/2022/10/First_Wave_Data.xlsx.ods), which

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contains two different spreadsheets with the number of daily and cumulative infections for the months in which the first wave of COVID-19 cases in Spain occurred.

- *February_March_April:* contains the data corresponding to 90 days in the months of February, March and April 2020. In addition, two graphs show the different evolution of the number of daily and accumulated infections in these months.
- *Early_May*: contains the data corresponding to the first 10 days of May 2020, which you can use to check the validity of your predictions

We suggest you do it with Excel, Google Sheets or *GeoGebra*. You have two videos to learn the basics of Excel and *GeoGebra* works, but you can use another program if you prefer.

Link to the introductory video to Excel: https://youtu.be/pMe9nk4-_ko

Link to the introductory video to *GeoGebra*: https://youtu.be/mHIjJ2S1-Ug

Remember that you can also search and use other external information that may be of interest to you.

PART 3: Preparing the presentation of results

To share your work, prepare **three slides** to show the rest of the groups the work you have done, each slide focusing on one of the following three aspects:

1. What were the main questions you investigated about?
2. Which model have you chosen? What are its characteristics? Why do you think this is a "good" model?
3. What forecasts does this model offer for the first days of March?

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