SIMIODE Spring 2024 FREE Webinars

SIMIODE is pleased to offer three informative webinars this spring. These events are FREE and offer opportunities for professional growth and meaningful thought.

SIMIODE – Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations is a non-profit Community of Practice dedicated to supporting the teaching and learning of differential equations in a modeling context. Hundreds of OER materials await your discovery and use at https://qubeshub.org/community/groups/simiode .

We offer two webinars on exceptionally useful and FREE software packages to facilitate teaching and learning of differential equations and one webinar on incorporating ethical reasoning into mathematics courses.

Here are the webinar dates, times, titles, and presenters with more details available on the **through clicks** below each listing.

Please join us through FREE Registration

9 April 2024, 3:30 – 5:00 PM Eastern USA Time
Title: Using WikiModel to Rapidly Create, Simulate, Fit and Share Mathematical Models
Speaker: Sami Kanderian, Founder and Creator of WikiModel, Germantown MD USA
Click for Complete Details

17 April 2024, 3:30 – 5:00 PM Eastern USA Time
Title: Using Insightmaker to Enhance Understanding in a First ODE Course
Speaker: Erich McAlister, Fort Lewis College, Durango CO USA
Click for Complete Details

1 May 2024, 3:30 – 5:00 PM Eastern USA Time
Title: A Practical Guide for Incorporating Ethical Reasoning into Mathematics Courses through Modeling Problems
Speakers:

- Feryâl Alayont, Grand Valley State University, Allendale MI USA
- Korana Burke, University of California, Davis, Davis CA USA
- Jeremy Shaw, Oregon State University-Cascades, Bend OR USA

Click for Complete Details

See all the Open Education Resource materials and offerings at SIMIODE's Community of Practice page https://qubeshub.org/community/groups/simiode .

9 April 2024, 3:30 – 5:00 PM Eastern USA Time

Title: Using WikiModel to Rapidly Create, Simulate, Fit and Share Mathematical Models

Speaker: Sami Kanderian, Founder and Creator of WikiModel, Germantown MD USA

Abstract: WikiModel (https://www.wikimodel.com) was created to enable teachers, students, scientists, and engineers to create custom mathematical models consisting of any number of closed form closed form and/or Ordinary Differential Equations (ODEs) with no programming. The cloud-based application requires no installation and is run via a web-browser to facilitate rapid implementation. Equations are typed in as they appear in a textbook. ODEs are automatically integrated via Runge-Kutta methods. Once created, these models can be simulated with parameters whose values are user defined or fit to experimental data whereby optimal parameters are identified.

The software implements non-linear or linear least squares methods as required. Desired state variables and datasets are selected from a drop down to be output in one or more plots. Once created, models and datasets can be shared to the public, a defined group of users, or remain private. The library of public models already contains pre-existing model examples in various scientific disciplines. WikiModel was built to rapidly simulate, and fit models in academia or industry. It is a tool that will hopefully motivate students and scientists to explore and benefit from the value mathematical models bring in solving real world problems without being bogged down in their implementation.

Description: The expectation from this webinar is to have attendees interact with WikiModel themselves. A bank of differential equation modeling scenarios is already available in the SIMIODE website here: https://qubeshub.org/community/groups/simiode/publications.
In each group of attendees, an existing model example will be selected from a set of choices based on interest. The example will contain experimental data whereby the model will not only be simulated, but also fit to the experimental data. Attendees will perform the following steps:

1. Register and login to WikiModel
2. Create blank “New Workspace” from the “Workspace Input/Output” drop down
3. Under the “Model” tab:
    a. Enter the name of the independent variable, its “Start”, “Delta”, and “End” values.
    b. Enter one or more model equations in the “Model Equation” table. Equations can be regular analytical equations or differential equations. If “y” is a state variable and “t” is the independent variable, the left-hand side of the differential equation would be “dy/dt”.
    c. Enter model parameter variable names and values in the parameter table.
4. Under the “Data” tab:
    a. Enter the experimental data with at least two columns one for the independent variable. For example, if “t” is the independent variable in the model, then there should be a “data_t” column in the table and if you want to fit the state variable “y” of your model to experimental data, there should be a “data_y” column in

the table. The independent and dependent variables do not have to be “t” and “y”; they can be anything.

5. Under the “Plots” tab:
    a. Select at least one result plot you wish to see the simulated results for. At least one is required. Since you are fitting experimental data to a simulated state variable, you can plot both the simulated state variable and the experimental data on the same graph. For example, “t” and “y” can be the X-Axis and Y-Axis for one plot with a non-zero line thickness, and “data_t” and “data_y” can be plotted on the same graph with a larger point size and 0 line thickness. Intermediate state variables can also be plotted on subsequent graphs if so desired.
6. Go back to the “Model” tab:
    a. Try simulating the model with the specific parameter values you entered by clicking the “Simulate Model” button and observe the resulting plot(s).
    b. Try changing one or more parameter values, re-simulate the model and observe the changes in the plots.
    c. When you are ready to fit the model to the experimental data select the modeled state variable you want to fit and the experimental data you want to fit it to from the “Fit Variable” and the “To Data” dropdowns respectively. Now hit “Fit Model” and observe if the simulated plot is close to the data. The identified parameters of the fit are in the “Fit Value” column.
7. Save your workspace by selecting “Save Workspace As” under the “Workspace Input/Output” drop down. In the pop-up window:
    a. Type in your model’s name under “Model Name”
    b. Give it a category under “Model Category”. It can be anything like “Physics”, “Heat Transfer” or “Fluidics”, etc…
    c. Type in a name for your dataset under “Dataset Name” and give it a brief description under “Dataset Description”
    d. Chose the level of access under “Workspace Permission” for others to be able to view and simulate (but not modify) your model.
    e. Click on “Save Workspace”.

More detailed instructions can be found here: https://www.wikimodel.com/about/application-instructions. ***Live support will also be available during the webinar session.***

If you have time, feel free to explore WikiModel’s library of publicly available saved models in various scientific disciplines to which you have just added yours (if you chose to make it public).

You may also view slides and watch a presentation, “WikiModel—A Web-based Software Application that Enables Teachers, Students, Scientists and Engineers to Simulate, Fit, and Share Mathematical Models,” by the presenter at SIMIODE EXPO 2024 conference at https://qubeshub.org/community/groups/simiode/expo/2024 .

Return to Main Page

17 April 2024, 3:30 – 5:00 PM Eastern USA Time

Title: Using Insightmaker to Enhance Understanding in a First ODE Course

Speaker: Erich McAlister, Fort Lewis College, Durango CO USA

Description: In this webinar we will discuss the use of the system dynamics software Insightmaker (https://insightmaker.com/) in a first course in Ordinary Differential Equations (with a modeling emphasis). We will begin by exploring the equivalence of systems of ODE and stock-flow models through examples.

Through this exploration we will note ways in which stock-flow modeling can enhance the understanding of models, as well as establish some graphical ODE idioms (what this means will be explained). Time permitting, we will also discuss parsing Insighmaker files into Python (for more advanced analysis) and the underlying abstract mathematics of stock-flow diagrams (category theory).

Participants are encouraged to create FREE Insightmaker accounts in advance so that they can follow along and create their own insights and think about what modeling scenarios they might use them for.

You may also view slides and watch a presentation, “Teaching ODEs with Insight Maker,” by the presenter at SIMIODE EXPO 2024 conference at https://qubeshub.org/community/groups/simiode/expo/2024 .

Return to Main Page

1 May 2024, 3:30 – 5:00 PM Eastern USA Time

Title: A Practical Guide for Incorporating Ethical Reasoning into Mathematics Courses through Modeling Problems

Speakers:

- Feryâl Alayont, Grand Valley State University, Allendale MI USA
- Korana Burke, University of California, Davis, Davis CA USA
- Jeremy Shaw, Oregon State University-Cascades, Bend OR USA

Description: In this session, participants will learn about how ethical reasoning can be incorporated into mathematics courses by modifying modeling problems already used in their courses. We will start with introducing what ethical reasoning is and why it is important to include ethical reasoning into mathematics courses. We will then share specific mathematical modeling problems with the audience and describe how ethical reasoning prompts can be integrated into each problem.

Audience members will practice adding ethical prompts to mathematical modeling questions in small breakout rooms. We will also allow time for questions from the audience, including asking for advice on how to make a specific problem more ethical. Participants are encouraged to bring a favorite modeling problem from one of their math courses.

At the end of this session, participants will be ready to adapt their mathematical modeling problems in their own courses to incorporate ethical reasoning into those mathematics courses, and will have additional examples to build off provided in a shared public folder.

You may also view slides and watch a presentation, “A General Framework for Incorporating Ethical Reasoning into Mathematical Modeling,” by Rohit Thomas, University of California Davis, Davis CA USA; Erin Griesenauer, Eckerd College, St. Petersburg FL USA at SIMIODE EXPO 2024 conference at https://qubeshub.org/community/groups/simiode/expo/2024 .

Return to Main Page