

Volume VII Number 2

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MAA VIRTUAL PROGRAMMING MINICOURSE 15 APRIL 2021 ENHANCE YOUR DIFFERENTIAL EQUATIONS COURSE WITH MODELING

To be offered **15 April 2021, 1:00 - 3:00 PM Eastern US Time** and sponsored by the Mathematical Association of America, this two-hour, minicourse will engage participants in teaching with modeling in differential equations by having them work through a prepared module for remote teaching. They will have the opportunity to work with experienced faculty and peers to discuss best practices and plan ways to incorporate modeling pedagogy in their differential equations courses in a variety of formats - face to face, hybrid, and remote/online.

This minicourse will be led by the experienced team of
Audrey Malagon, Virginia Wesleyan University, Virginia Beach VA USA,
Lisa Driskel, Colorado Mesa University, Grand Junction CO USA, and
Brian Winkel, SIMIODE, Cornwall NY USA .

Check out the full schedule of all these MAA events where you can also register for this specific minicourse. Join us!

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SIMIODE OFFERS SUMMER 2021 NSF WORKSHOPS DEMARC FOR DEVELOPERS AND MINDE FOR PRACTITIONERS

SIMIODE will offer **NSF Workshops for DEMARC for Developers and MINDE for Practitioners**

These workshops are offered to US Citizens or faculty teaching in US Schools.

SIMIODE Developer's Workshop (DEMARC)

DEMARC -- Differential Equations Model and Resource Creators -- Workshop will meet virtually (via Zoom) for four Tuesdays in June in Summer 2021. This workshop aims to help those experienced in teaching modeling-based differential equations create shareable classroom resources which will be published in SIMIODE. DEMARC Fellows will receive a \$400 stipend and are provided all materials. The workshop will meet Tuesdays in June (June 8, 15, 22, 29) from 1 PM - 4 PM Eastern US Time.

To apply to be part of this workshop, please submit the following to Director@simiode.org by **1 May 2021 Deadline**.

- Letter of interest describing your experience using modeling-based pedagogy and a commitment to attend all four weeks of the workshop
- Curriculum Vita
- Sample of a classroom modeling project or activity you have created
- At least two ideas for new modeling activities you hope to develop in the workshop

SIMIODE Practitioners Workshop (MINDE)

MINDE -- Model INstructors in Differential Equations -- Workshop will meet virtually (via Zoom) over four days, 7-8, 10-11 June 2021. Each day we will meet 11:00 AM - 1:00 PM and 2:00 PM - 4:00 PM Eastern US Time, with a 2-hour break in the middle.

MINDE -- Model INstructors in Differential Equations workshop is a "practitioner's workshop", ideal for those who would like to learn more about how to foster a modeling-first approach in their differential equations class. The workshop experience includes "hands-on" demonstrations, group discussions, and activities facilitated by experienced faculty. This MINDE Workshop enables participants to engage with colleagues in discovering, experiencing, and planning to use innovative modeling opportunities in support of their teaching methods. MINDE Fellows selected for this workshop will receive a stipend of \$200 and are provided all materials.

To apply to be part of this workshop, please submit a Curriculum Vita and a Letter of Interest to Director@simiode.org by **1 May 2021**. In the letter you should describe the following:

- your experience teaching differential equations,
- the primary pedagogy you have been using,
- your interest in using modeling-based pedagogy, and
- a commitment to attending all parts of the workshop.

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SIMIODE ONLINE TEXT ***DIFFERENTIAL EQUATIONS: A TOOLBOX FOR MODELING THE WORLD***

Kurt Bryan, Rose-Hulman Institute of Technology, Terre Haute IN USA, is authoring a SIMIODE online, hyperlinked text, *Differential Equations: A Toolbox For Modeling The World*, in SIMIODE which will bind rich modeling resources so faculty can teach a complete differential equations course motivated by modeling and students can save a bundle of money! Dr. Bryan (with co-author Tanya Leise, Amherst College, Amherst MA USA) has authored several pieces in *SIAM Reviews* over the years. For example they explain [The \\$25,000,000,000 Eigenvector: The Linear Algebra behind Google](#). Dr. Bryan has also authored (with Allen Broughton, Rose-Hulman Institute of Technology) *Discrete Fourier Analysis and Wavelets - Applications to Signal and Image Processing*.

The SIMIODE online text will have the traditional topics flow, but will be rooted throughout in modeling as a motivation and teaching approach with links to SIMIODE and other resources. By 15 May 2021 there will be full complete version online for consideration in Fall 2021 use in your course.

You can get access to the **preliminary version** by writing to Director@simiode.org with your personal request. After 15 May 2021 you can get access to the ready to use published version in the same manner. Visit to see the [Table of Contents](#).

So for now, know there will be a very affordable and solid text - for \$45 US - that will motivate learning differential equations through modeling. The text will include traditional exercises and solutions in addition to rich motivating modeling activities from SIMIODE and elsewhere. All other resources in SIMIODE will remain FREE as Open Educational Resources (OER) while this text will bring together the modeling approach SIMIODE supports, weaving together and binding the freely available SIMIODE resources. In addition, modeling activities, exercises, and projects, along with rich sections on dimensional analysis, parameter estimation and system identification, and control theory, for example, will point the way to applications for students while motivating them to see the value and context of differential equations in operation.

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SIMIODE EXPO 2021 INTERNATIONAL VIRTUAL CONFERENCE- 12-13 FEBRUARY 2021

SIMIODE offered a successful and rich virtual conference, **SIMIODE EXPO 2021, 12-13 February 2021**, with minicourses, contributed paper sessions, panels, and more for faculty AND students.

Hundreds from around the world are attended this intimate, content packed conference, focused on teaching differential equations with modeling, and MUCH MORE!

We are offering the Slides and Videos from each of these interesting presentations. Visit the [conference site](#), select a talk you would like to attend, click on Video to see the talk or Slide to view the presentation slides. Enjoy!

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NEW MODELING SCENARIOS IN SIMIODE

Mary Vanderschoot, Wheaton College, Wheaton IL USA published her Modeling Scenario, [Modeling a Grazing System](#), in which she says, "One of the most well-known mathematical models in ecology is the Lotka-Volterra predator-prey system of differential equations. Initially, this model was used to analyze interactions between two animal populations. But ecologists discovered that it could also be applied to plant ('prey') and herbivore ('predator') interactions. A grazing system (such as sheep in a pasture) is a special type of plant-herbivore system in which the herbivore population is controlled by humans. Because the number of herbivores does not change, the model consists of a single differential equation for the vegetation."

Further, PROF Vanderschoot, also published her enriched Modeling Scenario, [Plants Versus Herbivores](#). She says in her abstract, "In a recent study of plants and herbivores on an island in the North Sea, ecologists made a surprising observation: Instead of more vegetation resulting in more grazers, more vegetation resulted in fewer grazers." Sounds interesting!

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CONTRIBUTE IN SUPPORT OF SIMIODEE

SIMIODE is a 501(c)3 US IRS non-profit organization and depends upon individual contributions and foundation support. If you believe in our work and would like to contribute financial support in whatever amount is comfortable for you please do so through our [Donate Button](#). You will receive a formal receipt and a personal letter of appreciation from us. We will also list you in our List of Contributors and Supporters. Thank you.

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PUBLISH YOUR CLASS EFFORTS IN SIMIODE

If you are teaching differential equations of some sort you have probably written and assigned projects. Consider publishing your materials online in SIMIODE using our peer reviewed,

double blind referee system. More and more colleagues are accepting our invitation for sharing and publishing their teaching materials in SIMIODE for others to enjoy. Join in with us!

SIMIODE maintains a [double-blind, peer-reviewed process](#) for quality online publication of Modeling Scenarios and Technique Narratives. However, we encourage authors to submit their ideas at any stage of development and/or class projects for immediate feedback of a less formal nature. We will render constructive support and encouragement as well as technical feedback. In the past the SIMIODE Director, Brian Winkel, as Founding Editor of the journal *PRIMUS*, found this to be a very good way to foster confidence, help prospective authors contribute to the broader community, and get their ideas published. Please drop us a note with your ideas and/or materials to Director@simiode.org. We will respond quickly!

You can see how to submit your materials [here](#). What you do is important to your students, but it is also worthy of sharing with colleagues and their students. Step up and write up your projects for SIMIODE. You will have an online refereed publication at SIMIODE. You will be pleased to know others are using your ideas, building on your success, and enjoying what you share with your students. So, what are you waiting for? Just do it!

One purpose of SIMIODE is to offer colleagues solid, refereed teaching material on which they can base a modeling first course in differential equations. Thus publishing your new ideas and activities for students is a main objective of SIMIODE so others can see your fine work and engage their own students in similar manner. However, it is reasonable to ask yourself, "Why should I prepare, submit, and publish in SIMIODE?" [Here](#) we give you many good reasons to publish in SIMIODE. Check them out and see that many fit you. Then join us by sending us your efforts.

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WORDS FROM THE DIRECTOR

SIMIODE is a **community** which is alive, vibrant, and rich in resources and individual talents to assist colleagues who wish to teach differential equations using modeling to motivate students. There are a number of ways you can add to the community:

Contribute materials. You can learn more about this at our [Author Information](#) section and get even more details once you have signed into SIMIODE. There you will find types of materials and instructions on how to contribute and begin the process leading to publication in SIMIODE. Register to referee and review submitted materials. Good scholarship merits attention and our double-blind, peer-referee system affords quality reviews of submitted materials.

Post slides from your presentations, classes, or talks. When you give a talk you can post your slides, details of the talk or meeting, and comments at [Resources: Presentations](#). Now that you have spread the word beyond the SIMIODE community bring it back home for your fellow SIMIODE members to see. As always please let us hear from you with your concerns, your news, and your activities. Contact us at Director@SIMIODE.org.

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