

Volume V Number 6

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WELCOME TO SIMIODE AND OUR NEWSLETTER

SIMIODE - Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations is about offering a Community of Practice for teaching differential equations using modeling and technology upfront and throughout the learning process. Learn more at our dynamic website, www.simiode.org. SIMIODE is now entering its sixth year as a community, its second year of National Science Foundation funding, and the fifth year of this newsletter.

Please drop us an email to Director@simiode.org and let us know how we can improve SIMIODE and this Newsletter. Or if you have an idea for coverage you would like us to publish in the Newsletter then let us know or perhaps write up an "item" for our next issue. We would love to hear from you.

SIMIODE is a 501(c)3 nonprofit organization, based in Cornwall, New York in the United States.

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SIMIODE AT JOINT MATHEMATICS MEETINGS DENVER CO USA 15 - 18 JANUARY 2020

SIMIODE will have a strong presence at the Joint Mathematics Meetings in Denver CO USA, 15 - 18 January 2020. Plan to attend sessions which interest you. We list the offerings below. See the [JMM 2020 Program](#) for complete details including presentation titles and presenters.

AMS Special Session #7: Wall to Wall Modeling Activities in Differential Equations Courses

Saturday January 18, 2020, 8:00 AM-11:50 a.m, Room 108, Meeting Room Level, Colorado Convention Center

There will be eight sessions offering attendees views of modeling in courses and in outside the classroom activities.

MAA Contributed Paper Session #13: Modeling-First Inquiry-Based Course Activities

Wednesday, 15 January 2020, 8:00 AM-10:55 AM

Wednesday, 15 January 2020, 2:15 PM -3:10 PM

Both at Room 502, Meeting Room Level, Colorado Convention Center

There will be twelve information and example filled presentations from which you can take away course activities for YOUR students.

Minicourse #10: Wall to Wall Modeling Scenarios for Differential Equations

Thursday, 16 January 2020, 9:00 AM-11:00 AM, Part A

Saturday, 18 January 2020, 9:00 AM -11:00 AM, Part B

Both at Room 704, Meeting Room Level, Colorado Convention Center.

You can register for this Minicourse (and others) at [Registration page for JMM 2020](#).

This minicourse offers participants active experience in using eight Modeling Scenarios from the double-blind, peer reviewed materials in the resource collection found at the SIMIODE Community of Practice www.simiode.org. Time will be devoted to reflection on use in participants' home setting. We offer this minicourse in support of colleagues who wish to experience modeling activities which can then be used in teaching their differential equations courses. The leadership team of accomplished authors and teachers will demonstrate how one could effectively use a modeling approach in a differential equations course through the classroom simulation the minicourse will offer. In the process of doing the specific modeling activities during the minicourse we will share with participants information and insight into the many resources of the SIMIODE community. Through minicourse participation colleagues will gain confidence in their ability to bring modeling into their own classroom to teach differential equations and expand their network of like-minded colleagues.

SCUDEM Gathering and Information Session

Friday, 17 January 2020, 7:00 PM - 8:30 PM, Mineral Hall E, Hyatt Regency Denver

Convention Center

Join with colleagues who have participated in SCUDEM (SIMIODE Challenge Using Differential Equations Modeling) and celebrate the experience as well as offer suggestions for improving SCUDEM.

Also learn about upcoming SCUDEM V 2020, 14 November 2020 and the opportunities for you and your students as coach and local site host coordinator.

SIMIODE NSF Workshop Gathering Meeting

Thursday, 16 January 2010, 7:00 PM - 8:30 PM, Granite A, Hyatt Regency Denver Convention Center

Join with colleagues who have participated in SIMIODE's DEMARC and MINDE summer workshops to discuss and help improve future workshops and also learn about upcoming summer DEMARC 2020 workshop and MINDE 2020 workshop.

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PLANNING FOR SIMIODE ONLINE HYPERLINKED TEXT

Kurt Bryan, Rose-Hulman Institute of Technology, Terre Haute IN USA, will author a **hyperlinked text in SIMIODE which will bind resources so faculty can teach a complete differential equations course**. 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". He has also authored (with Allen Brogthon, Rose-Hulman Institute of Technology) *Discrete Fourier Analysis and Wavelets - Applications to Signal and Image Processing*.

We are seeking problems or exercises, NOT on the scope of Modeling Scenarios, but which can be included in the text with credits to contributor. The text will have the traditional topics flow, but will be rooted in modeling as a motivation and teaching approach. We expect the text to come on line in 2022, so we have plenty of time to get great ideas in place. Contact Director@simiode.org with your materials.

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SCUDEM IV 2019 SUCCESS STORY - SEEKING HOST SCHOOLS FOR SCUDEM V 2020

SCUDEM IV 2019 took place in local sites around the world on 9 November 2019. SCUDEM, which stands for SIMIODE Challenge Using Differential Equation Modeling, offers teams of three undergraduate or high school students three modeling problems. Each team selects the problem of their choice and works on it for a week before Challenge Saturday, 9 November 2019 - and Challenge Saturday for SCUDEM V 2020 will be 14 November 2020. Student teams with their coach travel to a local site (your school perhaps) near their home campus for a day of collegial sharing. Here they submit an Executive Summary for judging; work on an additional feature for their problem but do not redo their model; participate with faculty in an active use of SIMIODE Modeling Scenarios during a first portion of a Faculty Development program along with faculty; enjoy the fun of team MathBowl; make a 10 minute presentation of their model results and get immediate feedback on their work by faculty judges. Faculty dig deeper into pedagogical issues of modeling in a second portion of the workshop. During the closing ceremony awards (Outstanding, Meritorious, and Successful) are presented.

We will be calling for local site host coordinators soon, but you can contact us at Director@simiode.org if you would like to host or if you have questions.

SCUDEM IV 2019 had local site host coordinators around the world, in Europe, Asia, Africa, and United States with 610 students engaging in the Challenge on Saturday, 9 November 2019.

Team registrations opens on 1 September 2020 for SCUDEM V 2020 to be held on Challenge Saturday, 14 November 2020.

Be sure to check out the [convincing videos](#) in which students and faculty share their enthusiasm and experience in engaging in modeling with differential equations in SCUDEM events past.

There are no registration fees for SCUDEM V 2020 in developing countries. This is our way of reaching out and supporting colleagues from these regions.

We invite all to join the [Facebook Group - SCUDEM Mathematical Community](#).

In our 12 July 2019 Blog we highlighted the results from a recently published article, "Building mathematics self-efficacy of STEM undergraduates through mathematical modelling," in the *International Journal of Mathematical Education in Science and Technology*, in which the authors conclude that SCUDEM increases students' self-efficacy in mathematical modeling. Do SCUDEM for your students!

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SIMIODE IS A COMMUNITY OF PRACTICE - FORUMS FOR CONVERSATIONS

We are pleased to announce that SIMIODE is a [Community of Practice](#) in the broad sense as defined by Etienne and Beverly Wenger-Trayner. SIMIODE is more than a set of resources and ideas for using modeling to motivate and teach differential equations. SIMIODE is Community and welcomes conversations, blogs, forums, and exchanges about practices, examples, experiences, materials, stories, student feedback, successes and improvements, and much more. Join us at [SIMIODE Community of Practice](#) and engage in meaningful conversations and exchanges. There are several places in SIMIODE in which we offer Forums on member interest topics. Once inside [Community of Practice](#) scroll down to Forums (Fora) for SIMIODE Members. Examples include [Use of Modeling Scenarios](#) and

Student Conversations about Modeling in Differential Equations Course. These and other Forums can be found in the [Forum Page](#) as well.

Also there may be forums found in your Groups, for example in the Teachers Group (our biggest group) we just added a Forum to other forums present called, "Modeling with Numerics" about fostering an exchange of ideas and experiences in using modeling to motivate numerical methods and programming for post calculus coursework, particularly differential equations. You can find Group defined Forums in your Dash Board once inside a Group of interest under Forum. Registered members can form a Group, invite members, and create their own Forums OR contact Director@simiode.org about forming a broader Forum for others to visit.

We have several ways to grow a Community of Practice. One way of doing so is introducing yourself to the community by making your profile rich in detail about your interests and background with use of tags and contact information. In SIMIODE one can search for colleagues by name or by interests using information you put on your Profile in the form of tags. We encourage folks to put themselves out there for others to find them and build connections. It could be a grad school buddy, a colleague from a former school, a person with the same advisor, a neighboring school associate, a friend, etc. When you make contact then pick up a conversation about uses of modeling in differential equations, the reason you are in SIMIODE!

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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.

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 new ideas and activities for students is a main goal of SIMIODE.

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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SUMMER 2020 SIMIODE NSF WORKSHOPS - NEVER TOO EARLY

Announcing and Inviting Applications for NSF SIMIODE Summer 2020 Workshops sponsored by the National Science Foundation and SIMIODE July 2020 at Virginia Wesleyan University, Virginia Beach VA USA.

23-29 June 2020 5-Day SIMIODE Practitioners Workshop - Ideal for those who would like to learn more about how to foster a modeling-first approach in the classroom. Workshop includes hands-on demonstration, group discussions, and activities facilitated by experienced faculty. MINDE (Model INstructors in Differential Equations) Fellows selected for this workshop have a \$300 registration fee and are provided all materials and room and board for 5 days.

8-13 July 2013 4-Day Intensive SIMIODE Developer's Workshop - Those with experience and ideas for writing differential equations modeling scenarios for classroom use are encouraged to apply. DEMARC (Differential Equations Model and Resource Creators) Fellows who are selected for this workshop are fully funded, including travel up to \$600, room and board, and a stipend up to \$600. Applicants are asked to provide evidence of successful modeling scenario development. The workshop will provide training and support for creating new modeling scenarios.

Complete information and application process here.
<https://www.simiode.org/uncategorised/nsf2020workshops>

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COMMENTS HELP CREATE COMMUNITY AT SIMIODE

For each Resource posting in SIMIODE community members have the opportunity to post COMMENTS. This is strongly encouraged as it will build conversations which will connect colleagues, improve material, and foster community. Any posted Comment will be emailed to the author of that resource and conversations can then begin.

Giving feedback, reactions, and corrections to authors is very important for the individual author and the wider SIMIODE community. If you visit and scan/read or actually use a Modeling Scenario or Technique Narratives please offer comments. You may even wish to upload a new resource which has significant added-value. If so then contact

Director@simiode.org to inquire how you can do this. We would welcome such efforts.

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NEW MODELING SCENARIOS IN SIMIODE AND OLDIES BUT GOODIES!

Contributed by Kimberly Spayd and James Puckett, Gettysburg College, Gettysburg PA USA, this project guides students through experimental, analytical, and numerical techniques for understanding the **heat (diffusion) equation** with nonhomogeneous boundary conditions. In particular, students collect data and model a physical scenario in which heat energy diffuses through a long, thin metal rod that has one of its ends submerged in hot water and the other end in room-temperature water.

Eric Stachura, Kennesaw State University, Marietta GA USA and Tamara Lozano, Yokogawa Corporation, Newman GA USA authored a chemical engineering scenario in which students are lead through a classical **chemical engineering problem**: to calculate the concentration profile of cyclohexane within a catalyst pellet by solving a second order linear differential equation.

Here are a few Oldies but Goodies.

Used by thousands of students, this never fail activity, written by Brian Winkel, SIMIODE, Cornwall NY USA, uses m&m candies to simulate **death and immigration**.

Jue Wang, Union College, Schenectady NY USA, takes students through real life scenarios to examine resonance and its destructive power using differential equation models in study about **shattering wine glass**.

These are but a few of the many new publications in SIMIODE for you to use with your students. We invite you to search for topics of your interest and include SIMIODE materials in your teaching.

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SIMIODE SOURCES FOR YOUR OWN MODELING SCENARIOS

SIMIODE offers **potential modeling scenario ideas**. There are hundreds of these! These are materials, thoughts, pointers, summaries, articles, etc. to encourage and support your modeling scenario ideas. You must be registered and signed in to view these resources. Consider these ideas and use them to design your own modeling scenarios for your students and then publish this material in SIMIODE.

Of course, you can publish your own source materials, perhaps ideas you have not been able to get to, but want to or wish to engage with others in producing a Modeling Scenario. Just upload them for all to see. Use the "Start a new Potential Scenario Idea" button and contribute.

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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.

Visit our SIMIODE Blog for thoughtful commentary or form your own blog.

Register to referee and review submitted materials. Good scholarship merits attention and our double-blind, peer-referee system affords quality reviews of submitted materials. Please, visit our [Manuscript Management system](#) and register as a referee.

Post slides from your presentations 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.

Attend a MAA Contributed Paper Session at MathFest or an AMS Special Session at JMM devoted to modeling in differential equations course work and see what others are doing. Step up after the talk and engage the speaker. You will have a new collegial friend!

Attend one of our **SIMIODE Workshops and Minicourses** at national mathematics meetings.

When you attend a talk on an application of differential equations encourage the presenter to consider sharing these ideas with the SIMIODE community. Encouragement helps young faculty expand their reach.

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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