SIMIODE Newsletter February 2020

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TABLE OF CONTENTS

MUCH NEW NEWSY NEWS!

- Summer 2020 SIMIODE NSF Workshops - Applications Sought
- MathFest 2020 Call for Papers Modeling in Your Differential Equations Course
- Planning for SIMIODE OnLine Hyperlinked Text - Seeking Your Input
- SCUDEM V 2020 Seeking Local Site Host Coordinators
- SCUDEM Lite for Intermountain MAA Section
- SIMIODE Modeling Scenarios in Spanish
- SIMIODE is a Community of Practice - Forums for Conversations
- Publish Your Class Efforts in SIMIODE
- Call for Papers for Special Issue of CODEE Journal
- Comments Help Create Community at SIMIODE
- New Modeling Scenarios Published in SIMIODE
- SIMIODE Sources for Your Own Modeling Scenarios
- Regional and Local SIMIODE Workshops Available
- Words from the Director

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 seventh year as a community, its third year of National Science Foundation funding, and starting the sixth 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. 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.
Return to Table of Contents

SUMMER 2020 SIMIODE NSF WORKSHOPS - APPLICATIONS SOUGHT

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 2020 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.

APPLICATION INFORMATION: Applications for both workshops are due on 1 May 2020 and we will return a decision by 15 May 2020 so participants can make summer and travel plans. We also offer a **PRIORITY APPLICATION DATE** of 1 April 2020 with return decision by 15 April 2020 for strong applicants who seek early decision. Applicants who are not successful for Priority Acceptance will then be considered in the 1 May 2020 deadline.

Complete information and application process here.
https://www.simiode.org/uncategorised/nsf2020workshops
Return to Table of Contents

MATHFEST 2020 CALL FOR PAPERS MODELING IN YOUR DIFFERENTIAL EQUATIONS COURSE

We are calling for papers for MathFest 2020, 29 July - 1 August 2020, in Philadelphia PA USA in our Contribiuted Paper Session: Modeling in Your Differential Equations Course – Just Do It!

The session abstract says, "In differential equations, a pivotal STEM course, effort is given to doing modeling to motivate students and facilitate transferability to cognate areas. Faculty who do modeling in differential equations courses share their efforts. This session offers

experiences, plans, and aspirations with specific, rich illustrations of modeling to enhance skills in both differential equations and its applications."

We are seeking 15 minute talks demonstrating modeling in your differential equations course. Come and share your creative efforts with others in this dedicated session at MathFest 2020. The session is Friday morning 10:20-12:10 and afternooon 1:30-3:30 in Grand Ballroom L.

Abstracts are due on 30 April 2020 at the MathFest 2020 website, https://www.maa.org/meetings/mathfest
Return to Table of Contents

PLANNING FOR SIMIODE ONLINE HYPERLINKED TEXT - SEEKING YOUR INPUT

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 Broughton, Rose-Hulman Institute of Technology) Discrete Fourier Analysis and Wavelets - Applications to Signal and Image Processing.

We are seeking modest 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 with links to SIMIODE and other resources. We expect the text to come on line in 2021, so we have plenty of time to get great ideas in place. Contact Director@simiode.org with your materials, ideas, questions, and suggestions.
Return to Table of Contents

SCUDEM V 2020 - SEEKING LOCAL HOST SCHOOLS FOR SCUDEM V 2020

SIMIODE Challenge Using Differential Equation Modeling - SCUDEM V 2020 will take place in local host sites around the world on 14 November 2020. SCUDEM offers teams of three undergraduate or high school students three modeling problems: physics/engineering, chemistry/life sciences, and social sciences. Each team selects the problem of their choice and works on it at their home institution for a week before Challenge Saturday, 14 November 2020. Student teams with their coach travel to a local host 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 are seeking local site host coordinators. See details in our Local Site Host Coordinator Guide SCUDEM V 2020, especially the Bottom Line Up Front section. You can contact us at Director@simiode.org if you would like to host or if you have questions.

On 9 November 2019 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. See our growing list of local sites for SCUDEM V 2020 and get your school listed as a host for SCUDEM V 2020.

Team and Faculty Coach registrations open 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. You can see all the previous events' problems and all student submissions for each year of SCUDEM, e.g., SCUDEM IV 2019 results.

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 visit and join the Facebook Group - SCUDEM Mathematical Community to see more joy in modeling with differential equations.

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!
Return to Table of Contents

SCUDEM LITE FOR INTERMOUNTAIN MAA SECTION

We are offering for the first time MAA Intermountain Section Student Team Challenge Using Derivative Action Modeling (SCUDEM Lite) at the Spring 2020 MAA Intermountain Section Meeting, 27-28 March 2020, to be held at Westminister College - Salt Lake City, UT USA. SIMIODE, in conjunction with the Intermountain Section of the Mathematical Association of America, is sponsoring a team event in which three member student teams from high schools or undergraduate schools will work on a modeling problem involving change. The modeling takes place at the team's home institution for a week and then teams will render their results in a 10 minute presentation at the section meeting. Registration is

now open through 18 March 2020.

We plan to expand this to other MAA Sections and ask section leaders to contact us at Director@simiode.org about arranging SCUDEM Lite in their MAA Sections for Spring 2021.
Return to Table of Contents

SIMIODE MODELING SCENARIOS IN SPANISH

Several SIMIODE Modeling Scenarios are now available in Spanish. We list them here for your use. Once at the scenario's website the Spanish version can be found at the Supporting Docs tab.

1-001-M&MDeathImmigration https://www.simiode.org/resources/132
1-005-OilSlick https://www.simiode.org/resources/196
1-107-AntTunnelBuilding https://www.simiode.org/resources/289
1-015-Torricelli https://www.simiode.org/resources/488
1-010-LSDAndProblemSolving https://www.simiode.org/resources/411
1-030-IntraocularGasBubbles https://www.simiode.org/resources/346
1-031-CoolIt https://www.simiode.org/resources/372
3-030-SecondOrderIntro https://www.simiode.org/resources/1724
3-061-ChemEngApps https://www.simiode.org/resources/6481

If you or your students are interested in translating for publication modeling scenarios from SIMIODE please contact the Director at Director@simiode.org and convey your interest.in SIMIODE!
Return to Table of Contents

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!
Return to Table of Contents

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 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.
Return to Table of Contents

ANNOUNCING A 2020 SPECIAL ISSUE OF THE CODEE JOURNAL

Engaging Learners: Differential Equations in Today's World.

CODEE – Community of Ordinary Differential Equations Educators offers the CODEE Journal, a peer-reviewed, open-access publication that publishes original materials promoting the teaching and learning of ordinary differential equations. After the success of the 2018 Special Issue of the *CODEE Journal*, Linking Differential Equations to Social Justice and Environmental Concerns, the Community of Ordinary Differential Equations Educators (CODEE) is seeking submissions for a 2020 Special Issue entitled, Engaging Learners: Differential Equations in Today's World, with an intent that extends the Social Justice theme. They are looking for papers that would appeal to educators and students, in which differential equations are applied to problems affecting our society.

Proposals (up to 500 words) are due before 17 April 2020, with notices of acceptance returned by 22 May 2020. Final Papers are due by 4 September 2020.

The previous issue reached 138 countries within a year, with each article having been downloaded over 500 times. The global impact continues to grow. In fact, over 2/3 of the downloads, for the last five years, have consistently been outside the United States!

Inquiries and submissions can be forwarded electronically to the issue editor: Dr. Samer Habre, shabre@lau.edu.lb.
Return to Table of Contents

COMMENTS HELP CREATE COMMUNITY AT SIMIODE

For each Resource posting in the 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.
Return to Table of Contents

NEW MODELING SCENARIOS IN SIMIODE

Contributed by Gabriel Nagy, Michigan State University, East Lansing MI USA, this project on wireless telegraphy is a multipart introduction to understanding what is a resonant solution, the beats phenomenon, and how both arise in context.

Jeff Pettit, Mathematics, Portland Community College, Portland OR USA, authored an activity on the spread of information which engages students in simulation for data collection and model verification.

Terrance Pendleton, Mathematics, Drake University, Des Moines IA USA, contributed a scenario on tropical storm windspeeds, saying "We model the decay of tropical cyclone winds once a storm makes landfall. We use data from two recent storms from the National Hurricane Center to estimate parameters emanating from a differential equation model."

Here are a few Oldies but Goodies.

m&m Death and Immigration is a tried and true Modeling Scenario used by thousands of students around the world with great success and when done on first day of class students will refer to principles learned throughout the semester. Try it. You will like it!

Sublimation of Carbon Dioxide offers data on sublimation of dry ice and a modeling opportunity which students can validate using data.

Ant Tunnel draws students interest, offers some bad models for testing, and uses only antidifferentiation solution to rate equation for time it takes an ant to build a tunnel of given length.

Torricelli's Law gives students the opportunity to model, collect data from YouTube SIMIODE Videos and validate their model.

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.
Return to Table of Contents

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.
Return to Table of Contents

REGIONAL AND LOCAL SIMIODE WORKSHOPS AVAILABLE

SIMIODE leadership offers regional and local SIMIODE workshops in which faculty can participate and learn more through experience in using modeling to teach differential equations. In November we ran a one day successful workshop at Savannah State University, Savannah GA USA, while in February 2020 we conducted a highly engaging five day faculty development workshop at the Technical University of Panama, Panama City PANAMA.



SIMIODE leadership have conducted minicourses and workshops at national mathematics meetings, e.g., MAA/AMS JMM and MathFest, summer NSF funded workshops, and regional MAA section workshops.

Such workshops can prove highly effective in engaging faculty where they are and with local colleagues to strengthen their own efforts to use modeling in differential equations coursework. Through these workshops we extend our SIMIODE Community of Practice. Contact us at Director@simiode.org to discuss a workshop in your area.
Return to Table of Contents

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.
Return to Table of Contents

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