SIMIODE Newsletter August 2021

Volume VII Number 4

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SCUDEM VI 2021 REGISTRATION OPEN NOW

SCUDEM — **S**IMIODE **C**hallenge **U**sing **D**ifferential **E**quations **M**odeling is a 3-student group modeling challenge that runs over multiple days culminating in a 10 minute video which is reviewed by judges. Team submissions will be judged *Outstanding*, *Meritorious*, or *Successful*. In SCUDEM V 2020 each team received, on average, 8+ judge reports for constructive feedback!

Teams choose one of the Challenge Problems provided in the areas of

- physics/engineering,
- chemistry/life sciences,
- social sciences/humanities,

and develop a model using differential or difference equations and a presentation.

Registration is open through 23 October 2021 and the Challenge Period for work on problems is 23 October - 15 November 2021. Early registration through 6 September 2021 is $10 US/student and thereafter $20 US/student, while registration in developing countries is FREE.

Watch presentations from SCUDEM V 2020 Outstanding Award recipients at SIMIODE's YouTube playlist. Read the full details about all our past events, including problem statements and results, in our wiki.

See Complete Rules for details of the challenge.

We need volunteer Coaches and Judges so please volunteer.

SCUDEM is administered by SIMIODE, a non-profit Community of Practice focused on a modeling first approach to teaching differential equations.
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SIMODE MIGRATION TO QUBES HUB COMING SOON

SIMIODE will be migrating its entire Community of Practice including thousands of members, hundreds of resources, and many other features to the rich HUBZero environment of SIMIODE in QUBES Hub. This is taking more time and effort than originally planned, but with the assistance of Science Gateways Community Institute - SGCI and HUBZero resources helping our own technical staff at SIMIODE we are working very hard to make this happen soon.

Before the final step in the migration we will inform all SIMIODE Community members of the move and share with them exact information and procedures to gain their place in our new SuperGroup in QUBES, principally to request new password at the site we share with you.

In advance, we apologize as we figure out how to reshape and take advantage of our local surroundings in QUBES to take advantage of the many rich, interactive, and social capabilities which motivated this migration. We will keep you posted.
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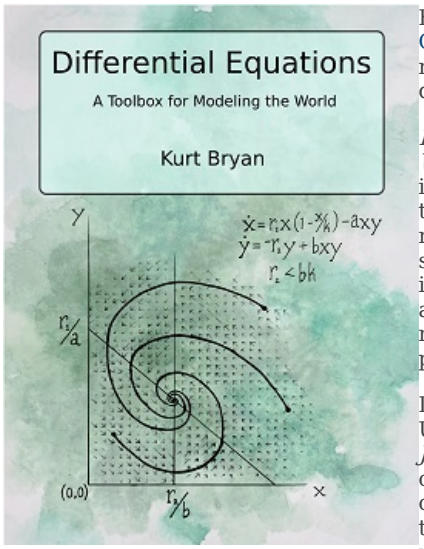
SIMIODE ONLINE DIGITAL TEXT
DIFFERENTIAL EQUATIONS: A TOOLBOX FOR MODELING THE WORLD

SIMIODE offers its digital online textbook, *Differential Equations: A Toolbox for Modeling the World*. The online low cost textbook is available for purchase through SIMIODE for $39US.

Authored by the distinguished teacher and writer, Dr. Kurt Bryan, Rose-Hulman Institute of Technology, Terre Haute IN USA, this text takes a modeling first and throughout approach to motivate the study and learning of differential equations in the spirit of SIMIODE, while linking to many SIMIODE Modeling Scenarios and other original activities.



Here we offer a copy of the Table of Contents and Chapter 1 to demonstrate our commitment to a modeling first and throughout approach in teaching differential equations.

Differential Equations: A Toolbox for Modeling the World puts applications and modeling front and center in an introduction to ordinary differential equations. In taking this approach we do not skimp on or skip over the mathematics, but use applications to motivate both subject and technique. The mathematics presented is interwoven with modeling to drive both the mathematics and understanding of the application under study and to make the case that differential equations provide a powerful, indispensable toolbox for describing the world.

Dr. Glenn Ledder, University of Nebraska, Lincoln NE USA, says in his forthcoming review in *The UMAP Journal*, "This book is the only one this reviewer is aware of that presents differential equations in a modeling context rather than merely adding a bit of modeling to the standard presentation. If you want to study the mathematics of differential equations in a modeling context, you are in the right place."

We also present some unconventional, but important topics not usually offered in introductory texts: dimensional analysis, parameter estimation, a brief introduction to control theory via Laplace transforms, nondimensionalizing and scaling of differential equations, and a more thorough treatment of electrical circuits. The text includes numerous exercises, including inline ``Reading Exercises,'' as well as a section of more extensive modeling projects at the end of each chapter, many based on published SIMIODE projects, and many new activities. Several projects include data sets for experimentation and model validation.

Purchasers of this text will be invited to engage in a SIMIODE Textbook - Teacher Group or a SIMIODE Textbook - Student Group in which all the resources appropriate to the respective interests of the group will be provided: solutions, hints, project ideas, data, computer code, forums, collaborative project space, etc.

Again, purchase this textbook, support SIMIODE, and enjoy the read.
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SIMIODE - MAA VIRTUAL PROGRAMMING WORKSHOP

SIMIODE will participate in the Mathematical Association of American (MAA) Virtual Programming Workshop effort with two workshop sessions, each 2.5 hours long and rich in detail and modeling with differential equations experiences for your courses. The workshops entitled, Modeling in Your Differential Equations Coursework, will be offered 1:00 PM - 3:30 PM Eastern US Time, on 26 and 28 October 2021. We will share details here, but also check on MAA site.
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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!

We are planning an expanded SIMIODE EXPO 2022 for early February 2022. Join us then. More to follow.
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NEW MODELING SCENARIOS IN SIMIODE

During the summer NSF sponsored DEMRAC, Developer Workshop, some 25 submissions from participants were submitted. Here are but a few listed for your consideration.

- Tracy Weyand, Rose-Hulman Institute of Technology, Terre Haute IN USA wrote up two approaches to modeling effect on one story building of earthquake without damping and with damping.
- Maila Hallare, Norfolk State University, Norfolk VA USA, and Iordanka Panayotova, Christopher Newport University, Newport News VA USA teamed up to produce four Modeling Scenarios: cancer therapy, oncolytic viruses, Lotka-Volterra model, and wireless power.
- Jacob Duncan, Winona State University, Winona MN USA, worked up material on insect outbreaks.
- Joshua Goldwyn, Swarthmore College, Swarthmore PA USA offered a very informative activity on neuron detection.
- Barbara Zubik-Kowal, Boise State University, Boise ID USA shared the ins and outs of

swimming pool maintenance.

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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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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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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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