

Volume II Number 3

WIN A FREE SIMIODE T-SHIRT

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WELCOME TO SIMIODE AND OUR NEWSLETTER

SIMIODE - Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations is about teaching differential equations using modeling and technology upfront and throughout the learning process. Learn more at our dynamic website, www.simiode.org

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WHY SHOULD I PREPARE, SUBMIT, AND PUBLISH IN SIMIODE?

One of the main purposes 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. See details on how to publish [here in SIMIODE](#).

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REGISTERING IN SIMIODE

If you have not registered in SIMIODE please go to our [Home Page](#) and do so to benefit from the rich resources in the SIMIODE community.

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ANNOUNCING SIMIODE MINICOURSE AT MATHFEST 2016 - COLUMBUS OH USA

TITLE: Teaching Modeling First Differential Equations - Building Community in SIMIODE.

TIME and LOCATION:

Part 1: Thursday, August 4, 3:30 PM - 5:30 PM, Taft D

Part 2: Saturday, August 6, 1:00 PM - 3:00 PM, Taft D

DESCRIPTION: This minicourse permits participants to experience SIMIODE - Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations, an online (www.simiode.org) community of teachers and learners of differential equations who use modeling and technology throughout the learning process. Participants do modeling scenarios from the student perspective, discuss pedagogical and content issues that might arise in such teaching, and initiate the development of their own modeling scenario contributions to SIMIODE through partnering with other participants during and after the minicourse. The minicourse is appropriate for all interested in teaching differential equations in a modeling first approach.

LEADERS: Therese Shelton, Southwestern University and Brian Winkel, SIMIODE

Our leadership team will be joined by Rosemary Farley and Patrice Tiffany, Manhattan College.

Complete details and registration information will be in the spring copy of MAA's *FOCUS* magazine and will be featured at the MAA MathFest 2016 [web site](#). Consider joining us and put the dates in your calendar.

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LOOKING AHEAD TO SIMIODE MINICOURSE AT JMM 2017 IN ATLANTA

The title of the minicourse is, "Teaching Modeling-First Differential Equations - Technology and Complete End Game Efforts." The team leading this effort will be Rosemary Farley, Manhattan College; Therese Shelton, Southwestern College; Patrice Tiffany, Manhattan College; Jon Paynter, US Military Academy; and Brian Winkel, SIMIODE.

We will offer experiences for building and teaching mathematical models with differential equations: epidemic model of school infirmary, Torricelli's Law, fishery management effort, post-operative retinal fluid dissipation, fair stadium design, sublimation of carbon dioxide, chemical kinetics, ant tunnel building, spread of oil slick, pursuit efforts, pharmacokinetics of LSD and paracetamol, shuttlecock fall, and lake algae. We will discuss the role technology plays in the end game modeling efforts of parameter estimation, non-linear regression analysis, and model comparison. Through hands-on small group learning, faculty will experience the use of modeling and technology to teach differential equations. We, of course, plan to use SIMIODE - Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations, an online (www.simiode.org) community of teachers.

Look for more details in Fall 2016 in MAA literature and website.

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FEATURED MODELING SCENARIOS

English Boarding School Epidemic - Sheila Miller, City Tech, City University of New York, has put forth a modeling scenario in which data is offered on an English boarding school epidemic and students build a model with differential or difference equations to estimate the parameters and validate the model.

Sublimation of Carbon Dioxide - Brian Winkel, Director of SIMIODE, offers a modeling scenario in which carbon dioxide sublimates and students build a differential equation model from reasonable principles. What would a model for the loss of volume in a block of dry ice (frozen carbon dioxide) entail? Data is given and the model needs to be validated.

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FREE ONLINE DIFFERENTIAL EQUATIONS TEXTS

In our **General Resource Material** we offer annotated listings of FREE online differential equations texts. Colleagues have shared their materials in complete text form, often with traditional course structure, as well as rich sets of resources from which to teach. Most texts offered cover the basics of technique and offer exercises. Some also offer modeling applications. Your students will appreciate a FREE text and you might enjoy the fresh approaches taken in such presentations. Try it. At least look at [what is available](#).

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SIMIODE CHANNEL AT YOUTUBE

SIMIODE has a channel at YouTube [SIMIODE YouTube Channel](#). In addition to an **introductory overview**, a video of what SIMIODE is and can be, there are several videos related to Torricelli's law in which students can collect their own data from a real physical event, model the phenomenon, estimate parameters, and confirm their analysis with comparisons of plots of final model and data. One video is for a right circular column of water in which the water is draining from the cylinder while a digital clock offers time to the thousandth of a second in the background and the height can be seen to the nearest millimeter. Here is an example at [Falling Column of Water in Cylinder](#). Another is of right circular cone of water in which the water is [draining from the cone](#) while a digital clock offers time to the thousandth of a second in the background and the height can be seen to the nearest millimeter.

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STREAMING OF VIDEOS IN SIMIODE

In the current version of the HUBZero platform for SIMIODE we can now stream all videos offered by colleagues who post them. This means individuals who cannot gain access to YouTube can get access to our videos directly at www.simiode.org. Moreover, now videos will be positioned at the appropriate place in support of the material offered. Here is an example [Cannister Falling in Water](#) associated with the modeling scenario [3-70-S-FallingInWater](#). These videos have been effective substitutes for real lab data acquisitions, indeed, they are videos of real lab data acquisitions. We will continue to also post videos on our [SIMIODE YouTube Channel](#).

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NEW MODELING SCENARIOS

A good number of Modeling Scenarios have worked their way through the referee and editorial process and are now available (with more on the way!) Here are some which might interest you.

David Culver of the United States Military Academy shared material used with cadets at West Point as one of their course-wide modeling projects in Modeling Scenario [1-24-S-MalariaControl](#). The abstract says, "This project offers students a chance to make policy recommendations based on the analysis of models using both linear (exponential decay) and non-linear (logistic growth) differential equations. The scenario is based on the deployment of the United States Army's 62nd Engineer Battalion to West Africa in the fall of 2014. During this deployment the primary medical threat to Soldiers was malaria. It is up to the student to model and evaluate two methods of malaria prevention, malaria chemoprophylaxis and mosquito population control, and make recommendations to their commander."

John Sieben of Texas Lutheran University offered an opportunity to model safe variable ascent rates for SCUBA divers in Modeling Scenario [1-41-S-AirToTop](#). The abstract says, "Divers, especially novice divers, have concerns about running out of breathing air while at depth. One common rule taught to SCUBA divers is to ascend no faster than thirty feet per minute. In this project we will examine safe variable ascent rates, time required for a safe ascent using variable ascent rates. Using a variable ascent rate we will calculate the breathing air required during ascent."

Rachelle DeCoste of Wheaton College and Rachel Bayless of Agnes Scott College created a unit about the introduction and spread of one word in literature in Modeling Scenario [1-32-S-WordPropagation](#). The abstract says, "This activity is a gentle introduction to modeling via differential equations. The students will learn about exponential growth by modeling the rate at which the word jumbo has propagated through English language texts over time."

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INDIVIDUAL MEMBER ACTIVITIES

Rosemary Farley of Manhattan College finished her semester course in which she regularly used modeling activities in teaching differential equations. She offered a [Blog on her course](#) over the weeks of the semester and is willing to share her Maple lab resources she prepared and used with colleagues who contact her. You can do this with an email directly to her at her [Profile page in SIMIODE](#).

Karen Bliss and Jessica Libertini of Virginia Military Institute played important and creative writing and editing roles in producing the [Guidelines for Assessment and Instruction in Mathematical Modeling Education \(GAIMME\)](#). The report is a joint effort of the Society for Industrial and Applied Mathematics (SIAM) and the Consortium for Mathematics and its Applications (COMAP). You need to [download this report](#) (it is FREE) and devour it. We quote from our [SIMIODE Blog](#), "Once you have this report in your hands and have read and absorbed it you are ready to launch into using more and more modeling (and never going back to anything less!) While the narrative addresses issues of how to teach, why you should teach, and how to assess what you teach, it is rich with appropriate examples, just in time to answer your questions and concerns about what this thing called modeling is and how it compares to what we have been doing in our classrooms all along."

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SOURCES FOR YOUR OWN MODELING SCENARIOS

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

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WORDS OF ENCOURAGEMENT 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 do this at [Resources: New](#). 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. Please, visit our [Manuscript Management system](#) and register as a referee.

Post slides from your presentations or talks. -- When you give a talk locally or beyond 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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