

## Volume III Number 1

### PLEASE SUPPORT SIMIODE WITH YOUR TAX DEDUCTIBLE CONTRIBUTION

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#### WELCOME TO SIMIODE AND OUR NEWSLETTER

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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](http://www.simiode.org)

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#### SIMIODE IS A TAX EXEMPT ORGANIZATION

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SIMIODE is a 501(c)(3) tax exempt organization and can accept tax deductible contributions from individuals, corporations, and foundations. Previous to this SIMIODE was privately funded with some much appreciated assistance from COMAP (Consortium for Mathematics and its Applications).

We have a matching grant opportunity through 1 June 2017 in which an individual will match, dollar for dollar, your contribution to SIMIODE. This will double the effect of your support. Also, please check with our own organization to see if they will match your giving.

As a mathematics education organization we are open to receiving public support. In fact, we need this support to exist, so please contribute. You can contribute financial support for SIMIODE in whatever amount you feel appropriate at [Donate](#). See our [Mission Statement](#) for reasons why you should support SIMIODE. All contributions are tax-deductible. For ANY contribution we will send you a letter of appreciation, acknowledging your contribution, for tax purposes. Please provide your email for this letter. Thank you.

You may confirm our NonProfit status at the official listing of SIMIODE in the IRS Organization List of NonProfit Organizations. Thank you.

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#### SIMIODE FEATURED IN THE UMAP JOURNAL

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The UMAP Journal, published by COMAP - The Consortium for Mathematics and its Applications, featured two articles by SIMIODE members.

"Modeling-First Approach to Teaching Differential Equations" was authored by Rosemary Farley, Manhattan College, Riverdale NY USA; Brian Winkel, SIMIODE, Cornwall NY USA; Dina Yagodich, Frederick Community College, Frederick MD USA; and Holly Zullo, Westminster College, Salt Lake City UT USA, and is in Volume 37, Number 4, Winter 2016 Edition, pp. 381-406.

The paper cites the broad support for using modeling in undergraduate mathematics coursework and addresses the possibilities for the undergraduate differential equations course while offering specific examples of use and narratives of several faculty who have engaged in a modeling approach to teach differential equations.

The second paper, "Fish Mixing," is a sharing of the Modeling Scenario 1-34-S-FishMixing published at SIMIODE and is co-authored by Eric Sullivan, Carroll College, Helena MT USA and Elizabeth Carlson, Carroll College, Helena MT USA. Elizabeth was a student at Carroll College and helped develop and teach this material with Eric. The piece is in Volume 37, Number 4, Winter Edition, pp. 407-416.

Congratulations to all!

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#### SCUDEM FOR YOU AND YOUR STUDENTS

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SIMIODE is sponsoring a modeling competition specific to the pivotal STEM course, differential equations. We call it Student Competition Using Differential Equations Modeling (SCUDEM). After a proof of concept run in October 2017 we plan to conduct SCUDEM at some 50 sites around the country in March 2018. We are seeking local site coordinators for whom we have a \$500 stipend.

Basically SCUDEM is for teams of three students working on one of three modeling problems in which differential equations would be appropriate (introductory, intermediate, and advance) at their home institutions for five days (Monday through Friday). Teams and faculty coaches/mentors then assemble at local sites (ten teams at each site) around the country for a Competition Saturday. Here, faculty devote the morning to Faculty Development activities to enhance their use of modeling in teaching while the student teams address an additional issue or aspect of their selected modeling efforts offered Saturday morning. Each site would have a local faculty coordinator and a student assistant (funded from participation fees).

Students deliver an Executive Summary by noon for assembled faculty to judge and then from 2 - 5:30 PM make a 15 minute presentation for assembled faculty and fellow competition students to judge. By dinner on Saturday all SCUDEM activities and awards are complete and exceptional team efforts will be invited to submit a Modeling Scenario for consideration as a refereed publication in SIMIODE.

If you are interested in learning more about SCUDEM, either to register teams, to participate and/or lead in Faculty Development sessions, or to serve as a local host and receive a \$500 stipend please, [contact us](#).

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## WHITE PAPER -- REASONS FOR SIMIODE

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You can see (and learn) a lot by just looking. Visit, read, and share our White Paper on [Reasons for SIMIODE](#). Share the news and information about our work with colleagues and friends. Let them know there are exciting options and possibilities for teaching differential equations.

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## WHAT ARE YOU WAITING FOR? PUBLISH IN SIMIODE.

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If you are reading this then you probably are teaching differential equations of some sort. Moreover, you have probably written and assigned projects. Well, now is the time to publish your materials online in our peer reviewed, double blind referee system.

We quote Willie Nelson in our blog entry of 14 May 2016 [The Wisdom of Willie Nelson](#). He said, "If you can be content right now, then you'll always be content, because it's always right now." Do not just be content that you have done great things for your students. Share that good news and experience with others through publication in SIMIODE.

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

Your contribution can be as broad in scope as in [4-20-S-AnIEDBlast](#) or as focused with a modest modification of a text problem as in [1-93-S-SucroseReaction](#).

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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## PUBLISHING YOUR STUDENTS' PROJECTS

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You assign projects in your differential equations courses, often encouraging students to find project areas of interest to them. You collect them and take the time to grade them and give them feedback. As you read them there are several which really stand out. They are exceptionally well-written; they involve interesting mathematics - stuff you did not realize; they extend the mathematics you offered them in your course; and they leave you with a great feeling about your students.

Encourage and enable your students to submit these excellent projects for publication in SIMIODE.

We have a place for publishing completed student projects so others can see the work of your best and finest. Have your students submit their project to our [Manuscript Management](#) site for refereeing, editing, and acceptance. They can also submit supplemental materials, e.g., video, spreadsheet, data sets, computer algebra files, posters, PowerPoint slides, extra pdf files.

We believe quality student work is worthy of display, of sharing, and of praise. Do this for your students. Help them publish their good work at SIMIODE.

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## COMMENTS HELP CREATE COMMUNITY AT SIMIODE

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For each posting in SIMIODE community members have the option to post COMMENTS. This is strongly encouraged as it will build conversations which will connect colleagues,

improve material, and build community. Any posted Comment will be emailed to the author of that resource and conversations can then begin.

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## MODELING SCENARIOS YOU MIGHT CONSIDER USING IN YOUR TEACHING

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We publish more and more Modeling Scenarios all the time after they have worked their way through the referee and editorial process and are now available.

In [1-37-S-CommonColdSpread](#) Corban Harwood of George Fox University in Newberg OR USA guides students to simulate and investigate the spread of the common cold in a residence hall. An example floor plan is given, but the reader is encouraged to use a more relevant example. In groups, students run repeated simulations, collect data, derive a differential equation model, solve that equation, estimate parameter values, visually evaluate the consistency of the model with their data, and present their results to the class.

In [1-7-S-AntTunnelBuilding](#) we pose the prospect of modeling just how long an ant takes to build a tunnel. With a bit of guidance students produce a model for the time it takes to build a tunnel of length  $x$  into the side of a damp sandy hill. This leads to a very simple differential equation model to demonstrate to students the power of modeling and differential equations. Faculty who attend SIMIODE workshops and minicourses like this Modeling Scenario.

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## REGISTERING IN SIMIODE

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

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## SIMIODE WORKSHOP AT MATHFEST IN CHICAGO IL USA - 26-29 JULY 2017

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This 80 minute, one session, hands-on workshop will give participants an opportunity to actively experience what it is like to learn and teach in a modeling-based differential equations environment. We will do this with engaging learning examples, situations in which modeling gives rise to mathematics, and examples of approaches taken by colleagues who have taught this way. The rich Modeling Scenarios from the SIMIODE - Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations community will serve as examples and working opportunities. The examples offered will involve participants generating and collecting data through experiments, building a mathematical model, estimating parameters, validating the model, and creating the need for learning more about differential equations as a direct result of the modeling activity. The collegial narratives which demonstrate the effectiveness of using modeling to motivate the study of differential equations will be taken from a number of different school settings. Workshop participants will leave with a wealth of examples they can use to use a modeling-based approach in their own teaching of differential equations.

Organizers are Rosemary Farley, Manhattan College; Therese Shelton, Southwestern University; Patrice Tiffany, Manhattan College; and Brian Winkel, SIMIODE.

The Spring issue of the MAA's *FOCUS* will have details and registration information.

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## FREE ONLINE DIFFERENTIAL EQUATIONS TEXTS

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We offer [annotated listings of FREE online differential equations texts](#). This is one of the more popular sections when colleagues visit our site. There are over two dozen such 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. Many offer modeling applications. Your students will appreciate a FREE text and you might enjoy the fresh approaches taken in such presentations. Try it!

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## SIMIODE CHANNEL AT YOUTUBE

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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.

Most recently we posted a [video](#) of a simulation of [m&m Death and Immigration Modeling Scenario](#). Here students can conduct the simulation and collect data without the equipment used in the real simulation.

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## SOURCES FOR YOUR OWN MODELING SCENARIOS

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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

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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 at our [Resources: New](#) section. There you will find types of materials and instructions on how to contribute and begin the process leading to publication in SIMIODE.

**Please 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.

**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](mailto:Director@simiode.org).

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