

Volume III Number 2

SCUDEM IS COMING TO SIMIODE

TABLE OF CONTENTS

- SIMIODE is a 501(c)(3) tax exempt organization - please support us
 - SCUDEM for You and Your Students
 - What are you waiting for? Publish in SIMIODE.
 - Publishing Your Students' Projects
 - Comments Help Create Community at SIMIODE
 - Modeling Scenarios You Might Consider in Your Teaching
 - SIMIODE Workshop at MathFest in Chicago IL USA - 26-29 July 2017
 - Paper Session on Modeling with Differential Equations at MathFest 2017
 - Special issues of PRIMUS Journal on Modeling in Differential Equation
 - FREE Online Differential Equations Texts
 - SIMIODE Channel at YouTube
 - Sources for Your Own Modeling Scenarios
 - Words of Encouragement from the Director
-

WELCOME TO SIMIODE AND OUR NEWSLETTER

SIMIODE, a 501(c)(3) nonprofit organization based in Cornwall, New York in the United States, was founded by DR Brian Winkel, Emeritus Professor of Mathematics, United States Military Academy, West Point NY USA in 2013. Contact: Director@SIMIODE.org.

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

[Return to Table of Contents](#)

SIMIODE IS A TAX EXEMPT ORGANIZATION

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.

[Return to Table of Contents](#)

SCUDEM FOR YOU AND YOUR STUDENTS

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 an inaugural SCUDEM on 14 October 2017 at Mount Saint Mary College, Newburgh NY, for schools within a two hour drive of Newburgh NY we plan to conduct SCUDEM at sites around the country on 21 April 2018. We are seeking local site coordinators for whom we have a \$500 stipend as well as \$200 for student assistants and \$400 for awards and local refreshment support. Contact us at Director@SIMIODE.org if you are interested or want to learn more.

SCUDEM is for teams of three students working on one of three modeling problems in which differential equations would be appropriate modeling tool (introductory, intermediate, and advance) at their home institutions for five days (Monday through Friday). Teams and faculty coaches then assemble at local sites (12 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 student assistant(s) (funded from participation fees).

Students deliver an Executive Summary by noon for assembled faculty to judge and then from 2 - 4:00 PM in two parallel sessions make a 10 minute presentations with break and judging time for assembled faculty and fellow competition students. By 4:30 PM on Saturday all SCUDEM activities and awards are complete. Exceptional team efforts will be

invited to submit a Modeling Scenario as a refereed publication in SIMIODE.

Be sure to see [sample problem](#), [sample executive summary](#), and [sample presentation material](#) as well as [additional sample problems and scoring rubric](#).

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 see [complete SCUDEM details](#) or contact us at Director@SIMIODE.org.

[Return to Table of Contents](#)

WHAT ARE YOU WAITING FOR? PUBLISH IN SIMIODE.

If you are teaching differential equations of some sort you have probably written and assigned projects. Consider publishing your materials online in our peer reviewed, double blind referee system.

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.

[Return to Table of Contents](#)

PUBLISHING YOUR STUDENTS' PROJECTS

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.

[Return to Table of Contents](#)

COMMENTS HELP CREATE COMMUNITY AT SIMIODE

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.

[Return to Table of Contents](#)

MODELING SCENARIOS YOU MIGHT CONSIDER USING IN YOUR TEACHING

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 [3-110-S-MilitarySpringMassApplication](#) Randy Boucher and Ivan Dungan of the US Military Academy at West Point offer several scenarios for developing specifications for a military vehicle's shock absorber system which must be met by as it traverses over rocky terrain.

In [8-2-S-Text-TrigSumRepresentation](#) students are asked to develop criteria for a trigonometric sum to model a given signal. This is a prelude to Fourier analysis, with students actually discovering the essential materials and approaches which will prove useful in solutions of partial differential equations by the separation of variables technique.

We point out two Modeling Scenarios involving modeling falling coffee filters, a classic physics class experiments. [3-16-S-FallingCoffeeFilters](#) features data collected locally while [3-17-S-StackedCoffeeFilters](#) features data from the literature with an application of Akaike Information Criterion (AIC). The AIC permits a modeler to compare models in terms of sum of squared errors, number of data points, and number of parameters.

[Return to Table of Contents](#)

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.

[Return to Table of Contents](#)

SESSION ON MODELING WITH DIFFERENTIAL EQUATIONS AT MATHFEST 2017

Here is an opportunity to share news of your use of modeling in your differential equations course in a Contributed Paper Session, "Enrichment, Experiences, and Examples with Modeling in Differential Equations Courses" to be held at MathFest 2017 in Chicago IL, 27-29 July 2017. See [MathFest 2017 website](#) for details on registration and how you can contribute to this session with your own ideas. The deadline for Abstracts is 30 April 2017. The session is moderated by Ellen Swanson, Centre College, Danville KY; Chris McCarthy, Borough of Manhattan Community College, New York NY; and Brian Winkel, SIMIODE, Cornwall NY. Papers from this session will be considered for a Special Issue of PRIMUS journal on modeling in differential equations.

[Return to Table of Contents](#)

SPECIAL ISSUE OF PRIMUS

PRIMUS will publish a special issue on "A Modeling First Approach to Teaching Differential Equations" and will have a Call for Papers soon (by 15 April 2017) with an open period until November 2018. The Guest Editors for this issue of PRIMUS are Ellen Swanson, Centre College, Danville KY; Chris McCarthy, Borough of Manhattan Community College, New York NY; and Brian Winkel, SIMIODE, Cornwall NY.

Consider sharing your enthusiasm for modeling in your classroom with colleagues in a highly respected peer-reviewed journal, PRIMUS.

[Return to Table of Contents](#)

FREE ONLINE DIFFERENTIAL EQUATIONS TEXTS

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!

[Return to Table of Contents](#)

SIMIODE CHANNEL AT YOUTUBE

SIMIODE has a channel at YouTube [SIMIODE YouTube Channel](#). We have some great videos from which you can collect data in modeling with differential equations and this would be a great place to post student and faculty videos from which one could collect data from modeling. Just let us know if you have such material and we can make posting happen. We will need some text to post as to context and use; maybe even a Modeling Scenario published in SIMIODE.

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.

[Return to Table of Contents](#)

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.

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](#)

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 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.

[Return to Table of Contents](#)

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