

## Volume III Number 3

### SCUDEM HAS ARRIVED AT SIMIODE

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#### WELCOME TO SIMIODE AND OUR NEWSLETTER

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**With apologies for being very late this issue.**

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).

SIMIODE, a 501(c)3 nonprofit organization based in Cornwall, New York in the United States. Contact: [Director@SIMIODE.org](mailto:Director@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.

In 2017 we have received \$23,510 thus far in contributions. We ask for your help in increasing that amount so that SIMIODE can continue and expands its mission.

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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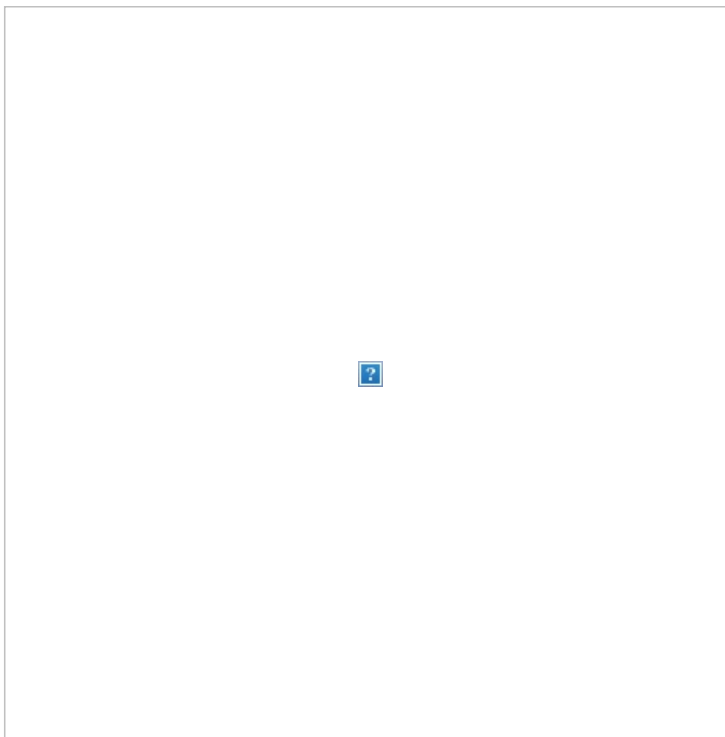
#### SCUDEM FOR YOU AND YOUR STUDENTS

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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 an inaugural SCUDEM on 14 October 2017 at Mount Saint Mary College, Newburgh NY USA, for schools within a two hour drive of Newburgh NY we will offer 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 if you are interested or want to learn more.

Here is a map of the 66 SCUDEM Local Host Sites currently in the United States, with more signing up all the time. We shall be conducting a campaign to offer more Local Host Sites in fall and early winter. See a [complete list](#) of current SCUDEM 2018 Local Host Sites.

SCUDEM is for teams of three students working on one of three modeling problems in which differential equations would be appropriate modeling tool 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 10 minute Presentations 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](mailto:Director@SIMIODE.org).

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

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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.

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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 [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.

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## SIMIODE MINICOURSE AT JMM IN SAN DIEGO CA USA - 10-13 JANUARY 2018

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Under the title, "Starter Kit for Teaching Modeling-First Differential Equations Course," the minicourse will support colleagues who wish to start using rich modeling resources to teach differential equations. Our method uses actual experience with classroom materials and discussions on how to initiate such practices in participants' courses. Participants will be placed in the role of students early in a differential equations course in which modeling is the driving force. The minicourse offers tested and successful modeling scenarios which engage students and bring forth differential equation notions and concepts through modeling.

Watch for details in MAA Focus and Notices of the AMS.

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## AMS SPECIAL SESSION AT JMM ON MODELING IN DIFFERENTIAL EQUATIONS

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The session is organized by (1) Corban Harwood, Mathematics, George Fox University, Newberg OR USA; (2) William Skerbitz, Mathematics, Wayzata High School, Plymouth MN USA; (3) Dina Yagodich, Mathematics, Frederick, Community College, Frederick MD USA; and (4) Brian Winkel, SIMIODE, Cornwall NY USA.

The organizers of the AMS Special Session, Modeling in Differential Equations - High School, Two-Year College, Four-Year Institution, at the Joint Mathematics Meetings in San Diego, California, 10-13 January 2018, invite you to give a 20 minute talk in the sessions scheduled for Wednesday, 10 January 2018 (20 minute talk with 10 minute break between talks - 14 talks in all, 8:00 AM - 10:50 AM and 2:15 - 6:05 PM.

These sessions will give colleagues who have used modeling to motivate differential equations an opportunity to share their experiences, models, and results. Differential equations form a pivotal STEM course and this course is taught in high schools, two-year colleges, and four-year institutions by faculty with many different backgrounds and dispositions. Often, goals for the course and the down course clients for the course differ. In an effort to engage students and invigorate the course by basing it on the original intent of differential equations, namely understanding change, modeling is employed to introduce and motivate the study of the mathematics as well as confirm its applicability. This offers students rich motivational support for continuing in their mathematical studies at a crucial time in their young careers.

Presenters will discuss the value of modeling to them as teachers and to their students as learners. Both pedagogical and technical details will be presented. Issues will include finding material to support this approach; taking first steps as a teacher; design of data collection experiences; engaging and working with students; contributing materials to the community; communicating the importance of motivating applications to students and colleagues; faculty development; and collaboration and pedagogical research.

Abstracts are due on 26 September 2017 at the [JMM 2018 Meeting site](#). The session number and name is SS 22A - AMS Special Session on Modeling in Differential Equations - High School, Two-Year College, Four-Year Institution.

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## SPECIAL ISSUE OF PRIMUS

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PRIMUS will publish a special issue on "Modeling in Differential Equations Courses." See the [Call for Papers](#) with an open period until 17 November 2017. 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.

The Guest Editors of this issue, encourage you to submit your new and groundbreaking research on activities, illustrations, descriptions, and assessments of efforts to use modeling to motivate and affirm the study of differential equations. They are looking for activities and materials which are described clearly and completely so readers can decide if the approach offered might work in their teaching and act on it accordingly. Narratives in which a modeling activity is proposed along with the description of how students build a differential equation model as an introduction to the specific differential equations topic to be studied are most desired, but applications of differential equations after the mathematical topics

have been introduced are appropriate as well.

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

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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](#). 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. We also posted a video to study a falling column of water with [blocks in the water](#), a nice application of Torricelli's Law

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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.

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.

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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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