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A SYSTEMIC INITIATIVE FOR MODELING INVESTIGATIONS & OPPORTUNITIES WITH DIFFERENTIAL EQUATIONS



Collegial Conversation - SCUDEM Student Team Members and Coaches

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SINIODE A SYSTEMIC INITIATIVE FOR MODELING INVESTIGATIONS & OPPORTUNITIES WITH DIFFERENTIAL EQUATIONS

A Community of Practice for teachers and students, teaching and learning the pivotal STEM Course in differential equations in a modeling first and throughout approach mathematics in context!

Outline of Conversation

SIMIODE Challenge Using Differential Equations Modeling

- Overview of SCUDEM
- Resources Available
- Role of Student Team Member
- Role of Coach
- Preparation Before Challenge Period
- Challenge Period Efforts
- Results, awards, and judges' reports
- Satisfaction

All SCUDEM materials are available at

https://qubeshub.org/community/groups/scudem/overview

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Registration	
Student Info	
Coach Info	
– Judge Info	
Past Events	
Announcements	
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Activity	

Discoverability: Visible

Join Policy: Open/Any

Created: 22 Jul 202 SCUDEM - SIMIODE Challenge Using Differential Equations Modeling

Overview

challenge differential equations High School SCUDEM SIMIODE Undergraduate

Join us for SCUDEM VI 2021 23 October-14 November 2021

Registration Open Now

SCUDEM — SIMIODE Challenge Using Differential Equations Modeling is a 3-student group modeling challenge that runs over multiple days culminating in a 10 minute video which is reviewed by at least 3 judges. Teams and Coaches may meet remotely. Team submissions will be judged *Outstanding*. Mentronicus, or Successful.

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.

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. We are in the process of migrating fully to QUBES.

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Please feel free to share this News Release on SCUDEM VI 2021 with colleagues.



SIMIODE Challenge Using Differential Equations Modeling

Three student team modeling challenge

Teams consist of 3 undergraduates or high school students, home schooling students, and a coach.

Students can register as a team with a coach or students and coaches can register independently and SIMIODE will match up team and coach.

Teams choose one Challenge Problem provided in the areas of

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

and develop a model using differential or difference equations and a 10 minute video presentation.

SCUDEM

- Runs over a multiple day Challenge Period (23 October - 14 November 2021)
- Culminates in production of a 10 minute video which is reviewed by at least 3 judges
- Upload video as Unlisted in YouTube for judging
- In SCUDEM V 2020 each team averaged more than 8 judges' reports
- Teams and coaches meet remotely or in person
- Team videos judged Outstanding, Meritorious, or Successful, and awarded certificates

Resources Available

- Guide for Coaches and Students
- Students Benefits and General Comments: Student Support Materials and Helpful Comments from Problem Author
- Previous SCUDEM Information, Problem Statement, and Student Submissions
- ► Rules for SCUDEM VI 2021
- SCUDEM Participants Increase Self-Efficacy in Mathematics

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Student perspective - Anthony Stefan

- ► Use Guide for Coaches and Students
- Resources available to practice are on the SCUDEM webpage
- Past examples including the SIMIODE
 YouTube channel of teams who received outstanding videos.

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Student perspective - Anthony Stefan - more

- Strategy to organize Gather a plan with your team mates before the statement release of when it does, how you will attack it.
- Strategy to model Discuss weaknesses, strengths of team members so when time comes allocation of tasks is appropriately distributed (e.g., usually there is someone who has the most intuition on a problem, pick that one).
- Strategy to present If a student is good at developing visual presentation and another is skilled in the mathematics, settle this early

Role of Student Team Member

- Respect and be sensitive to colleagues' contributions, expertise, feelings, cultures, emotions
- Be considerate to time zone issues
- Discuss team member individual strengths, e.g., data analysis, modeling, mathematics, programming, video, editing
- Read and consider three problems physics/engineering, chemistry/life sciences, and social sciences/humanities.

Role of Student Team Member - more

- Select one problem soon and stick with it
- Reasonable hours on task and meeting times
- Assign tasks and be accountable
- Gather and document source information
- Leave time for writing and video production
- Offer clear titles, labeled plots, modest text

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Practice and edit video

Coach perspective - Anthony Stefan

- ► Use Guide for Coaches and Students
- View our paper in The Rose-Hulman Undergraduate Mathematics Journal for Modeling Guide in action. Using Differential Equations to Model Predator-Prey Relations as Part of SCUDEM Modeling Challenge
- Meet students twice before and once after event (After Action Report - AAR), (1) explain and prepare for the event (communication between students), (2) practice modeling approaches, and (3) discuss the judges' comments.

Role of Coach

- Benefits
- Information for Coaches
- Role of the Coach
- Things Coaches Can Do
- Act with integrity . . . more on this
- Post SCUDEM talk at conference about experience, e.g., SIMIODE EXPO

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Act with integrity

During challenge period, no assistance from living people other than team members can be used on the problem effort.

Coaches are free to help teams prepare before the challenge begins. During the challenge, coaches are limited to moral support — we recommend pep talks and check-ins to be sure the group is working together in a positive manner.

Preparation Before Challenge Period

- Go over previous SCUDEM problems and student submissions
- Refer to Information for Coaches for ideas
- ► Team Meeting Software Platforms
- Useful Resources for Coaches and Students
 software

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Results, awards, and judges' reports

- All teams who submit video receive an award certificate: Outstanding, Meritorious, Successful
- SCUDEM V 2020 had 27 Outstanding Teams see SIMIODE YouTube Channel
- Team judges' reports SCUDEM V 2020 teams received on average 8+ judges' reports

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SCUDEM V 2020 - 14 November 2020

Student One Name and School Student Two Name and School Student Three Name and School Coach Name and Institution

are hereby granted the Outstanding Award for their submission of Problem # Title

as determined by faculty and peer judges and given by the Director, SIMIODE.



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Personal Satisfaction and Professional Growth

In 2019 article, **Building mathematics self-efficacy** of STEM undergraduates through mathematical modelling in *International Journal of Mathematical Education in Science and Technology*, the authors found intervention, particularly through SCUDEM, "promotes students' mathematics self-efficacy."

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Discussions and Questions



Deferential equations.

CartoonCollections.com

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