

Tulsa's Next Top Model

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Do you want to be Tulsa's next top model?

SCUDEM: SIMIODE Challenge Using Differential Equations Modeling

- University of Tulsa
- November 9, 2019

Q. What is SIMIODE?

A. Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations

- A *community of practice* dedicated to using modeling to teach differential equations.
- www.simiode.org: LOTS of free resources
 - Peer-reviewed modeling scenarios (lesson plans), presentations, data.

What is SCUDEM?

SCUDEM: SIMIODE Challenge Using Differential Equations Modeling

- Week-long modeling challenge for three member teams of undergraduates and high school students.
- Begins on a Friday at each team's home campus when the problems are revealed.
- Ends on Challenge Saturday (the end of the next week) at the given host site.

The student teams

- Work for the week on modeling a chosen scenario
 - Choices from physical, social, and life sciences.
- Prepare a written Executive Summary and ten minute presentation

But wait, there's more

- Faculty workshop: Incorporating modeling into differential equations courses
- MathBowl competition for students

Sidebar: MathBowl

Consists of several questions within a few rounds.

- Category: An Ode to ODE in Math

- The answer to each question is a math term which contains “ode” in its spelling.

Q. A fixed point on a phase portrait could be a stable, unstable, or saddle this.

- Category: Bad Movie Math

- Name the movie from which the incorrect math (either intentionally or unintentionally) derives.

Q. Scarecrow: “The sum of the square roots of any two sides of an isosceles triangle is equal to the square root of the remaining side.”

- Category: Punny Math

Q. When the student added 3 filet mignons to 4 filet mignons and only got 6 filet mignons, their work had this.

Example Problems (Paraphrased)

- 1 It's difficult to separate materials in recycling plants—especially papers and cardboard.
 - Test the feasibility of creating a apparatus where materials will be dropped from a great height and a fan blows air across the stream of falling material in an effort to separate 30-40% of the paper.
- 2 Young adults tend to self-organize into social groups or cliques.
 - Explore the dynamics of social interactions and grouping. Can a small number of social factors mimic complex group dynamics? What happens as the number of groups increases?
- 3 The sex of some reptiles depends on a number of factors including the incubation temperature of the eggs.
 - What is the effect of rapid changes in environmental temperatures? How long will it take for the impacts, if any, to become noticeable?
- 4 Describe how an underwater ping pong game could be played.

Prepare the team members for participation in the challenge.

- Recruiting: Try for diversity of skills.
- Training: Review past problems (available online) and/or introduce modeling strategies.
- Supervise travel arrangements.
- Cheerleader.

CANNOT assist in any way with the modeling efforts during the week of the challenge period.

- Communication allowed and encouraged. (Make sure everyone is getting sleep.)

Timeline of Competition

Friday, November 1, 2019

- Modeling problems released.

Challenge Saturday, November 9, 2019

- 8:30 am – Registration; students submit Executive Summary
- 9:00-10:30 am –
 - Faculty Development I: Modeling activities in ODEs and other courses.
 - Students address “additional/supplemental” issue.
- 10:30 am – Faculty and students reconvene for modeling activity and reflection.
- Lunch
- 1:00 pm –
 - Faculty Development II: Share modeling experiences and discussion.
 - Students participate in Math Bowl.
- 2:00 pm – Team presentations and judging.
- 4:15 pm – Award presentations

It's Catching On

Recent participation statistics:

- SCUDEM I (May 2017)
 - 20 students from 5 schools
 - 8 coaches
- SCUDEM II (April 2018)
 - 40 sites
 - 400 students from 85 schools
 - 110 coaches
- SCUDEM III (Oct. 2018)
 - 31 sites
 - 380 students from 58 schools
 - 93 coaches
- SCUDEM IV (Nov. 2019)
 - 44 host sites registered thus far.

How to Get Involved.

- Registration opens September 1, 2019. (See www.simiode.org)
- \$100 registration fee per team.
- Get to work.

Questions?