BMCM Info Session

Oct 26/27th 2016

International MCM

Goal of BMCM

- Preparation/exposure for the international competition

About the contest

- Organized by the Consortium for Mathematics and Its Applications (COMAP)
- Jan 19-23th this year
- In 2015, 7421 teams participated (389 US + international)

International MCM (cont.)

Format

- Teams of 3 undergraduates use mathematical modeling to solve real-world problems
- Get to choose between three problems
- Have 4 days to write a report on a model and solution

Plus have the option of ICM (Interdisciplinary Contest for Modeling)!

(Total of 6 problems to choose from)

New from 2015 (and into 2016!)

- Problem C will be “data insights”
- Data file will be provided, and will usually use statistics + pattern classification

Sample Problem (MCM 2016)

“Develop a model of the temperature of a bathtub water in space and time to determine the best strategy a person in the bathtub can adopt to keep the temperature even throughout the bathtub and as close as possible to the initial temperature without wasting too much water.”

Then is suppose to use model to develop the shape/volume of the tub, and model the addition of bubble additive.

Sample Problem (MCM 2016)

(“Goodgrant challenge”) Develop a model to determine an optimal investment strategy that identifies the schools, the investment amount per school, the return on that investment, and the time duration that the organization’s money should be provided to have the highest likelihood of producing a strong positive effect on student performance.

Data file included, with institution data! (“data insights”)

Sample Problem (ICM 2016)

(Thirsty planet) Develop a model that provides a measure of the ability of a region to provide clean water to meet the needs of its population. Use the UN scarcity map, and explain why and how water is scarce in that region. Use your model to show what the water situation will be in 15 years. Designate an intervention plan for the region, and model that.

ICM Problems usually include data sets to get started.

- International MCM / ICM problem solutions are ranked and awarded:

Outstanding (top 10ish), Finalist (top 1%), Meritorious (top 10%), Honorable Mentions (top 30%), Successful Participants (top 50%)

- Additional prizes + scholarships are offered by other organizations, such as MAA and SIAM and private companies.

- Local **BMCM** contest: organized by the **SIAM Student Chapter at Brown**!

BMCM: Local Contest Information

The Cool Stuff - Prizes!

- $50 per individual for the top two teams, sponsored for international contest
- $40 per individual for the 3rd and 4th teams
- Recognition for other teams

Details

- Dates: November 4th - 6th
- Problem will be released at 4:50pm on the website, and by email
- Email the final solution by 10am on the 6th

Local Contest Information

Rules:

- You may use ANY books, articles, Internet sources
- No collaboration with people other than your teammates
- Turn in your manuscript by the deadline (by email)
- Citations please!

Evaluation Criteria

- Make sure your paper is well written
  - No matter how good your model is, the paper is the only thing we will see.
- The summary is the most important part
  - Describe the problem, your model, results and how your model performed.
  - In the international competition, some papers will be accepted or rejected based on the summary alone
- Make sure to save time for writing your paper and summary!

Evaluation Criteria: The Body

- Rephrase the problem
  - Problems are open-ended and there are many ways to interpret and address them. Explain how you approached the problem.
- Explain your model
  - Clearly state and justify ALL assumptions your model uses
  - Motivate your model. Why did you choose your approach?
  - Clearly describe your model
    - Clearly define all variables
    - Include tables and figures to make it easier to understand
  - Analyze your model
    - What are the strengths and weaknesses of your model?
    - How could you test your model? How stable are the results to noise? Etc.
    - If you had more time, how would you expand/improve your model?
- Results
  - What does your model say about the question you have been given?

Evaluation Criteria: Other notes

- Include all references.
- Take the time to proofread your paper
  - Remember the reader must understand your model
- Don’t hesitate to include weaknesses in your model
  - You are not expected to create a perfect model in a day and a half!
  - This shows you have taken the time to thoroughly examine your model.
- See http://www.comap.com/undergraduate/contests/mcm/ for details

After BMCM

- Wrap-up presentation: we will discuss interesting ideas, models, assumptions in your reports
- Prizes and certificates will be awarded
- Set up potential prep session for students who will register for International MCM

Registering for International MCM

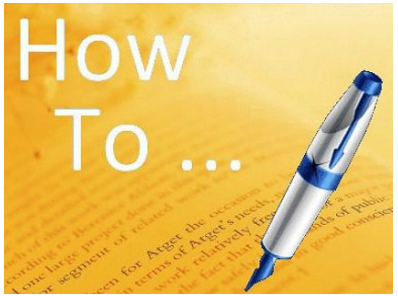
- Top two teams will be sponsored by the department, BUT any team can ask us to register them
- The fee is typically $100
  - Also $100 additional if you want to receive judges' comments.
- We can help with the registration.

Looking for teammates

- Students in this information session
- Friends or classmates with interests in math modeling/applications/computation
- Let us handle it, and we can play matchmaker: fill out the form and we will match your skills in forming a team.

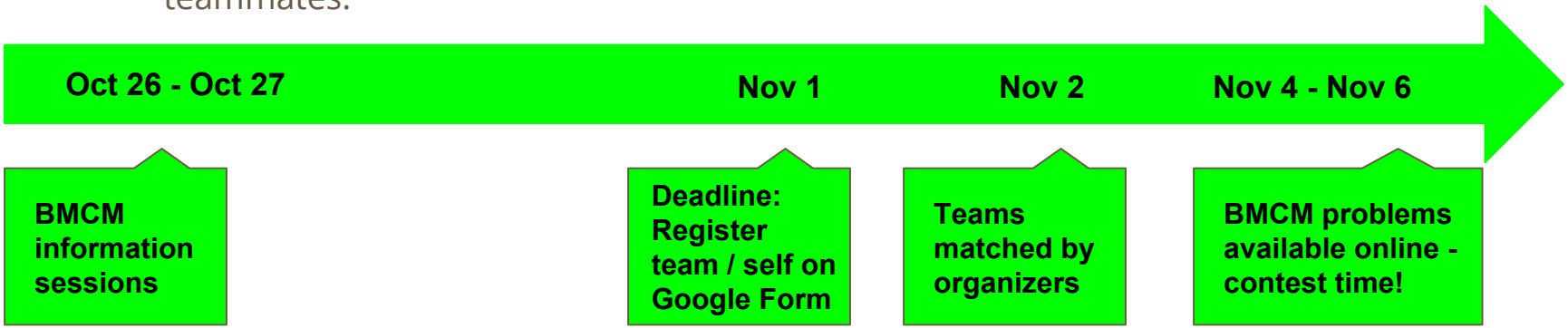
Suggested criteria for teammates searching:

- People you can get along with for a weekend
- People who you can collaborate and discuss with
- People with a variety of skills
  - Mathematical/statistical modeling
  - Programming experiences
  - Scientific writing skills
- Maybe elaborate within the box below in the Google form



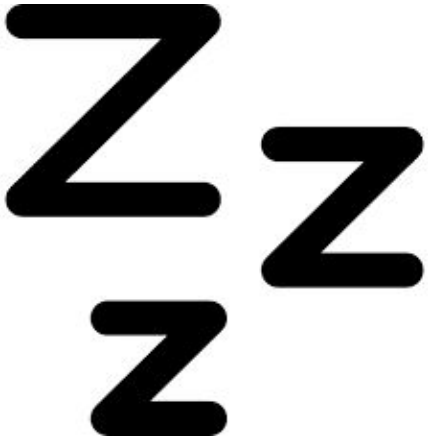
Team registration through Google Form (available online/by email)

1. Team up by yourself: look for teammates and register your team
   a. Register by Nov 3th, and you will receive the problems by email.
   b. Even if registering late, can still participate by downloading problems online.
2. Team up by organizers: we'll match teammates based on your strengths
   a. Fill out the Google Form by Nov 1st
   b. We will match you by Nov 2th
   c. Satisfied with team-up? Yes, register your team. No, still have 2 days to look for teammates.



Tips

- Pick a good team
  - Personality, time commitment, working style, conflict resolution, etc
- Be realistic with your goals
  - There’s really not that much time. Do something really well.
  - Don’t forget to eat and sleep
- Find a good place where you guys can meet and work
- Start writing early!
- (Optional, but recommended) Have fun.



How to get started: ICM Water Scarcity Problem

- Task: develop a model to measure ability of a region to provide water to population, apply the model to a country with water scarcity, and consider intervention strategies
- Considered three categories of water usage: personal, agricultural, and industrial
- Used water supply data and projections for those categories to estimate future scarcity

Water Scarcity in India

- Applied our model to India because current water scarcity and fast population growth make it a very pressing problem
- First considered infrastructure improvements like waste treatment
- Negligible effects on our projections

Water Scarcity in India

- Agricultural water usage is 95% of total water use in India
- Considered changes in staple crops to reduce this, including a transition from wheat and rice to millet
- Tangibly improved future prospects

We welcome any questions!

Contact us at: bmcm@brown.edu!

Or email one of the organizers:
veronica_ciocanel@brown.edu, shuai_jiang@brown.edu, ankan_ganguly@brown.edu