COMAP Mathematical/Interdisciplinary Contest in Modeling (MCM/ICM): Overview and Advice

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Mathematical/Interdisciplinary Contest in Modeling

What is the MCM/ICM?

It's an international contest for college undergraduates that challenges teams of students to clarify, analyze, and propose solutions to open-ended problems.

http://www.mcmcontest.com/

When is it this year (2025)?

Begins: Thursday, January 23 (5pm ET)

Six problems are posted.

Ends: Monday, January 27 (8pm ET)

Your team submits a written report.

Mathematical/Interdisciplinary Contest in Modeling

Eligibility

- Undergraduate student (any major)

What's in it for you?

- Challenge your brain
- Solve a real world math problem
- Get recognition for it on an international stage
- Develop your interpersonal skills through teamwork
- Impressive resume credential and an advantage when applying for internships/graduate school/jobs
- Chance for your team to win the International COMAP Scholarship Award ($9000 split among the team members)

Award Designations

1. **Outstanding Winner**
   - The “best of the best” in problem solving, analysis, conclusions, and communication of results.
2. **Finalist**
   - Present complete and logical analysis in an organized and clear presentation above and beyond simply addressing the requirements.
3. **Meritorious**
   - The report addressed all requirements in a clear, well-supported, well-organized, and well-presented manner.
4. **Honorable Mention**
   - The team’s solution report indicated an above average effort in addressing all problem requirements.
5. **Successful Participant**
   - The team made a concerted effort to respond to the contest problem and submit a solution report. The report, however, had incomplete responses to all or some requirements, and/or showed some deficiencies or weakness.

What types of problems are to be solved?

Each team (consisting of up to **3** students)
chooses **1** problem out of:

MCM problems:

- *Problem A:* Continuous
- *Problem B:* Discrete
- *Problem C:* Data Insights

ICM problems:

- *Problem D:* Operations Research/Network Science
- *Problem E:* Environmental Science
- *Problem F:* Policy

Examples of Past MCM Problems (2020)

Problem A: Continuous

Moving North: How will climate change move the fish habitats around Scotland and what can fisherman do to preserve their livelihoods?

Problem B: Discrete

The Longest Lasting Sandcastle(s): What is the best 3D sandcastle that can survive the longest against waves and rain?

Problem C: Data Insights

A Wealth of Data: How should a company use Amazon's rating stars and comments about current products to effectively launch a new product?

Examples of Past ICM Problems (2020)

Problem D: Operations Research/Network Science

Teaming Strategies: What can we learn about effective team strategies from soccer passing data?

Problem E: Environmental Science

Drowning in Plastic: To what extent can we limit plastic waste and what are the equity implications of doing so?

Problem F: Policy

The Place I Called Home. . . : Who should we send to colonize Mars?

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Get Prepared

- Read through COMAP's official directions at: http://www.mcmcontest.com/
  - Pay attention to submission document formatting rules
- Read through advice documents at: https://modeling-contests.math.ufl.edu/mcm/
- Read through past problems and determine features of successful solution papers
- Get to know your teammates

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Thursday (start at 5pm)

Research and Choose Problem

- Use Google (Search, Scholar, and Books) to find as many sources as possible for ALL SIX problems
  - You want to find models that already exist – then you do not need to come up with one completely on your own! Scholarly papers, databases, and books should be your primary source of information
  - Finding related software packages/applets are also really helpful depending on the problem
- Then decide which problem to solve
  - Brainstorm: review ideas, what is most promising?
- By the end of the night: choose problem, LOTS of resources, beginnings of modeling

Friday

Model, Research, and Write

- The focus should be on making sure the model developed previously works and adding complexity to the model, or finish modeling the entire system
- Writing should begin as different parts of the model are finished
- By the end of the night: most of the modeling done, as much writing as possible

Saturday

Model and Write

- Don't forget to check out the resources the libraries might have (e.g. eBooks)
- Explore model refinements, sensitivity, etc.
- By the end of the night: all of the modeling done, most of the writing done

Sunday

Write

- Make sure you have NO mistakes in your model
- Leave time to print a copy of the paper for each group member, individually proofread paper, and then go through it page by page and make corrections
- By the end of the night: writing completely done and proofread at least once

Monday (end at 8pm)

Summary Sheet

- Each group member individually write a summary sheet, combine the best parts, then proofread and rework it a few times
  - The summary sheet needs to hook the judges
  - Provide some context and overview of problem
  - Describe what you did in general terms
  - Summarize main results
- Read through paper one last time to make final corrections
- Completely finish by 8pm and then submit a PDF of your solution documents (*strict* deadline of 9pm)

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Tips: Group Dynamics

- The group should exchange contact information and meet once before the contest begins to determine when and where you will meet during the contest.
- Try to achieve a division of labor in whatever way works best for your group.
- No voting! All group members should be on the same page
- Be adaptable.
- The contest is a significant time commitment – past participants have said they wished they had budgeted more time to do the best possible job!
- But make sure to get some sleep and take breaks!

Tips: Contest Deliverables

- Excellent writing and grammar is key – clearly explain what you did and be engaging, like you're telling a story
  - Only make the model as elaborate as you can fully understand and explain
  - Justify the choices you made in regards to your interpretation of the problem statement
  - Discuss strengths and weaknesses of your model and connect results with your model
- If you focus too much on your model, you will not have enough time to write about it and thoroughly explain it
  - Partial solutions are accepted though! So even if you feel like you didn't "complete" your solution, submit it!
- Use an interesting title for your written report!

Other Tips

- Prepare documents and code ahead of time
  - Basic LaTeX/Word documents that follow all typesetting restrictions should be set up and ready to go before the contest begins
  - Have a copy of all old computer code you have ever written so it can be pulled out and used immediately
- Make sure to validate your model with real sources
  - This can expose flaws that COMAP had in writing their problems, and you want to make sure that you can back up your claims
  - Don't forget to cite all of your sources, including software packages
  - Any use of AI tools must be reported (see official rules)
- You'll be surprised what you can learn in 96 hours!
- Follow @COMAPMath on Twitter for the most up to date information

After the Contest

Get recognized at the
Department of Mathematics Spring Celebration
on Thursday, April 24!

Present your solution at the
Undergraduate Mathematics Research Symposium (UMRS)
Date TBD, but after the Spring semester.