COMAP's Mathematical Modeling Contests:

Mathematical Contest in Modeling (MCM™)
Interdisciplinary Contest in Modeling (ICM™)

The Consortium for Mathematics and Its Applications (COMAP)

COMAP Webinar Recording Policy

- COMAP is recording the webinar.
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- By participating, you are agreeing that your contributions become part of the recording.

Webinar Agenda & Guidance

- Introduction
- MCM/ICM Contest Overview and History
- Example Contest Problems
- Get Ready! Form a Team, Prepare, and Succeed
- Partners and Awards
- Resources
- Questions & Discussion
  - Please use the CHAT function on the bottom of your screen to send questions to the panelists. Panelists will answer questions at the end of the presentation. Chat to all panelists and participants.

Introductions

- **Panelists:**
  - Sol Garfunkel, Executive Director, COMAP

  - Amanda Beecher, ICM Contest Director, Ramapo College of New Jersey

  - John Tomicek, Contest Coordinator, COMAP

COMAP - Background

- **Mission**: to improve mathematics education for students of **all ages**.

- **Founding**: 1980 as a non-profit organization.

- **Curricular & Professional Development Materials**: in print, video, and multimedia formats (e.g. UMAP Journal, Consortium, Mathematics: Modeling Our World, GAIMME, BioMath, MathModels.org).

- **International Modeling Contests:** encourage students to embrace the scientific method, sound modeling processes, and good problem-solving techniques.

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COMAP - Contests

• **International Modeling Contests:** Encourage students to embrace the scientific method, sound modeling processes, and good problem-solving techniques.

- **High School Mathematical Contest in Modeling** (HiMCM, 1999)

- **International Mathematical Modeling Challenge** (IMMC, 2015)

- **Mathematical Contest in Modeling** (MCM, 1985)

- **Interdisciplinary Contest in Modeling** (ICM, 1999)

MCM / ICM   Contest Overview

- **MCM (1985) / ICM (1999)**
  - Undergraduate contest.
  - Annually in February for 100 hours over a weekend.
  - Teams of 3 students from the same institution.
  - 2020: 20,956 teams from 23 countries/regions.

MCM / ICM Contest Overview

Students select from 6 problems in:

MCM
- A: Continuous Math
- B: Discrete Math
- C: Data Insights

ICM
- D: Network Science or Operations Research
- E: Environmental Science
- F: Policy

ICM - Why two contests?

business banking medicine ecology chemistry network science history sustainability sports international relations political science cultural preservation cooperative systems operations research environmental science information science biology engineering physics policy climate science data science finance economics

Benefits to students

1. develop problem solving skills
2. work in a team environment
3. apply knowledge outside the classroom
4. learn how to use mathematics as a tool to solve interesting problems
5. learn more about a topic or issue facing our world today
6. communicate results to technical and nontechnical audiences
7. ability to effectively use data
8. resume & interview booster

Benefits to Advisors

1. Showcase the value of modeling.
2. Develop students as professionals.
3. Engage students outside the classroom.
4. Mentor students.
5. Provide extra-curricular opportunities that match your research interests.
6. Create interdisciplinary partnerships with colleagues.
7. Joy of hearing students' positive experiences of solving a complex problem.

MCM
Problem A – Continuous Math

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

MCM
Problem B – Discrete Math

What is the best 3D sandcastle that can survive the longest against waves and rain?

MCM
Problem C – Data Insights

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

ICM
Problem D – Operations Research / Network Science

How do we get through airport security faster?

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

ICM
Problem E – Environmental Science

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

ICM
Problem F – Policy

- Who should we send to colonize mars?

MCM/ICM – Get Ready!

MCM/ICM – Get Ready!

- **Step 1:   Form A Team**
  - A team shall consist of up to three (3) undergraduate (or below) students from the same institution.

- **Step 2:   Team Advisor**
  - The role of advisor can be filled by any faculty or staff member at your school, or a student.
  - The advisor does not have to be from the mathematics department.
  - The advisor will act as the main point of contact for the team.

Step 5
Prepare

Step 1
Form A Team

Step 4
Register

Step 2
Choose a
Team Advisor

Step 3
Review
The Rules

COMAP

MCM/ICM – Get Ready!

- **Step 3:   Review The Rules**
  - Visit www.comap.com and select **Undergraduate Contests** for rules and Instructions.
  - Download the MCM-ICM: *Procedures and Tips for a Great Experience* Article.

MCM/ICM – Get Ready!

- **Step 4:   Register**
  - Advisors register as an advisor and then register their team(s).
  - The registration fee for MCM/ICM is $100 per team.
  - We accept payment via Credit Card, and payment must be made via our secure web site.

MCM/ICM – Get Ready!

- **Step 5:   Prepare**
  - Read some of the previous years' problems at www.comap.com.
  - Review some of the Outstanding papers from previous years at www.mathmodels.org.
  - Read the MCM and ICM issues of the UMAP Journals and www.mathmodels.org.

Contest Dates and Times

- **Registration**
  - Deadline: 3:00pm EST Start Day of the Contest Window.
- **Contest Window**
  - February weekend –Thursday through Monday - 100 hours
- **Solution Report**
  - Deadline: 9:00 pm EST Last Day of Contest Window.
- **We recommend** that you login to the contest web site using the Advisor Login link to verify that your team's Electronic Solution was received at COMAP.
- **Contest Results**
  - The results will be posted by early May each year.

MCM/ICM Successful Submission

- **Follow the Contest Rules**
  - Number of pages and type font
  - No names of school or students
- **Presentation**
  - Coherent, Organized, Articulate, Well-Written
  - Complete all problem requirements
  - Communicate the solution clearly
- **Citations and References**

Contest Designations

- **Designations** are based on the papers submitted.

- **Outstanding** designates the "Best of the Best" and the highest level submissions in terms of exemplary student work in modeling, problem solving, analysis, and communication.

- **Finalist** recognizes teams whose exemplary solution reports reached the final round of judging.

- **Meritorious** reports are excellent in many aspects of modeling and problem solving, and clearly addressed and presented all requirements.

- **Honorable Mention** indicates an above average effort in addressing all problem requirements, showing sound and supported processes in modeling.

COMAP Partners and Contest Sponsors

- **AMS** – American Mathematical Society

- **ASA** – American Statistical Association

- **INFORMS** – The Institute for Operations Research and the Management Sciences

- **MAA** – Mathematical Association of America

- **NCTM** – National Council of Teachers of Mathematics

- **SIAM** – Society for Industrial and Applied Mathematics

MCM/ICM Awards

- **$10,000 International COMAP Scholarship Award**
  - Four (4) top teams from all MCM/ICM Submissions.
- **COMAP Named Awards** - MCM Problems A, B, C and ICM Problems D, E, F.
- **AMS Award** - MCM Problems A, B, and C.
- **ASA Award** – Outstanding team for Problem C.
- **INFORMS Award** – Outstanding teams for MCM Problems A, B, C and ICM Problems D, E, F.
- **MAA Award** – MCM Problems A, B, C and ICM Problems D, E, F.
- **SIAM Award** –Outstanding teams for MCM Problems A and B.

Resources for Advisors and Teams at www.comap.com

- **MATHmodels.org**
- **Free Materials**:
  - GAIMME Report – COMAP & SIAM
  - BioMath
  - PS-Future
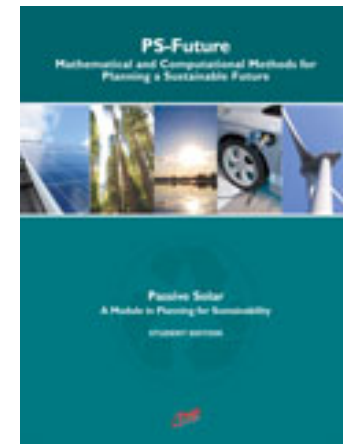
Twitter, Weibo, and MCM/ICM Webinar Webpage

- For the most up-to-date information about COMAP and our mathematical contests.
  - Follow us on Twitter @COMAPMath.
  - Follow us on Weibo at **COMAPCHINAOFFICIAL**
  - or Reach us by email at info@comap.com.

- Visit the COMAP MCM/ICM Webinar webpage at MathModels.org to download the materials discussed during this webinar.

Questions / Discussion

Please enter your questions into the Chat.

Contact Information

- Sol Garfunkel – Executive Director
- Amanda Beecher – ICM Contest Directors
- John Tomicek – Contest Administrator

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- www.comap.com

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Thank you for attending the COMAP MCM/ICM Webinar