All Things Modeling Resources Galore
SIMIODE EXPO 2022
Overview of COMAP – Curriculum & Contests
  • Kathleen Snook  Director, Operations & Contests, COMAP

  • MCM/ICM Contests
    • Amanda Beecher  Ramapo College of New Jersey

  • CiM Project
    • Michelle Isenhour  CiM Project Manager, COMAP

  • Resources/Contacts

  • Q&A
COMAP - Overview

• Consortium for Mathematics and Its Applications
  • An award-winning non-profit organization

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

• Founded in 1980. For over 40 years COMAP has worked with teachers, students, and industry to create learning environments where mathematics is used to investigate and model real issues in our world.
COMAP - Materials

• Curricular & Professional Development
  • Multidisciplinary
  • Academically rigorous
  • Fun
  • Print, video, and multi-media formats
    • For All Practical Purposes (PBS video series and textbook)
    • Against All Odds: Inside Statistics (PBS video series and textbook)
    • Mathematics: Modeling Our World (textbook series)
    • Consortium Magazine and UMAP Journal
    • Bio-Math (electronic student & teacher modules)
    • GAIMME Report
COMAP - International Contests

- **International Modeling Contests**: Encourage students to embrace the scientific method, sound modeling processes, and good problem-solving techniques.
  - Middle Mathematical Contest in Modeling (2021)
  - 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)
HiMCM, MidMCM & IMMC Overview

• HiMCM – High School  MidMCM – Middle Level/School
  • Annually in November over a 2-week window.
  • Teams of 4 students from same school address 1 of 2 problems in HiMCM or 1 problem in MidMCM.
  • No limit to # of teams from any school or country.
  • 2021: 705/54 teams from 20/4 countries/regions.

• IMMC – High School
  • Annually in March/April for a 36-hour block over a 5-week window.
  • Teams of 4 students from same school. Limit of 2 teams per country/region.
  • 2021: 51 teams from 27 countries/regions.

More info at www.comap.com
MCM/ICM Contest Overview

Amanda Beecher
MCM/ICM Contest Overview

• Teams of up to 3 Undergraduate students

2022 Contest: Feb 17-21

2021: 26,112 teams from 20 countries/regions
MCM/ICM Contest Overview


- Teams of up to 3 Undergraduate students
- 100 hours to:
  - Solve 1 of 6 real-world problems
  - Write up solution in at most 25 pages

2022 Contest: Feb 17-21

2021: 26,112 teams from 20 countries/regions
MCM/ICM Contest Overview

• Teams of up to 3 Undergraduate students
• 100 hours to:
  • Solve 1 of 6 real-world problems
  • Write up solution in at most 25 pages
• Teams select their own problem

2021: 26,112 teams from 20 countries/regions
MCM/ICM Contest Overview

• Teams of up to 3 Undergraduate students
• 100 hours to:
  • Solve 1 of 6 real-world problems
  • Write up solution in at most 25 pages
• Teams select their own problem

2022 Contest: Feb 17-21

COMAP

2021: 26,112 teams from 20 countries/regions.
MCM/ICM Contest Overview

• Teams of up to 3 Undergraduate students
• 100 hours to:
  • Solve 1 of 6 real-world problems
  • Write up solution in at most 25 pages
• Teams select their own problem
• Students work in their own location
  • Contest is administered online

2021: 26,112 teams from 20 countries/regions.

2022 Contest: Feb 17-21
MCM/ICM Contest Overview


• Teams of up to 3 Undergraduate students
• 100 hours to:
  • Solve 1 of 6 real-world problems
  • Write up solution in at most 25 pages
• Teams select their own problem
• Students work in their own location
  • Contest is administered online
• Only inanimate resources can be used –Advisor does not help with solving the problem!
• Unlimited # of teams from any institution or any country/region

2021: 26,112 teams from 20 countries/regions.

2022 Contest: Feb 17-21
MCM/ICM Contest Overview

Students select from 6 problems in:

- A: Continuous Math
- B: Discrete Math
- C: Data Insights
- D: Network Science or Operations Research
- E: Environmental Science
- F: Policy
A: How will climate change move the fish habitats around Scotland and what can fisherman do to preserve their livelihoods?

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

B: What is the best 3D sandcastle that can survive the longest against waves and rain?
ICM Past Problems

D: How do we get through airport security faster?

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

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

F: Who should we send to colonize Mars?
Contest Designations

- **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.

- **Successful Participant** indicates a successful submission and effort toward solving the problem.
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. Analyze data and use data effectively.
8. Boost resume & interview skills.
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. Experience the joy of hearing students’ positive experiences of solving a complex problem.
**COMAP and Partner Awards**

- **COMAP Scholarship Award** – Four (4) awards of $10,000 each to Outstanding Teams (Advisor $1000, Team Members $9000)
- **COMAP Awards** – Named award for each of the six problems.
- **AMS** – One Outstanding winning team for each of the six problems.
- **ASA** – One Outstanding winning team from MCM Problem C (Data).
- **INFORMS** – One Outstanding winning team for each of the six problems.
- **MAA** – One Outstanding winning team for up to six problems.
- **SIAM** – One Outstanding winning team for each of the six problems.
Certificate in Modeling

Michelle Isenhour
Certificate in Modeling – Why?

• **Educational institutions** need knowledgeable educators who can **develop** and **teach** courses in modeling

• **Professional organizations** need experienced analysts who can **model**, **simulate**, and **solve** tough problems
Certificate in Modeling

A development team is currently designing two integrated, yet distinct, certificates designed for working professionals:

- **Modeling Educator Certificate (MEC)**
- **Modeling Analyst Certificate (MAC)**
Course 1 – Intro to Modeling

Overview of Modeling – Big Ideas

• Develop the modeling **mindset**.
• Review the modeling **process**.
• Explore modeling **tools**.
• Lay the **foundation** for Course 2A, Modeling for Industry, and Course 2E, Modeling for Education.

[Diagram showing Course 1: Introduction to Modeling, Course 2E: Modeling for Educators, Course 2A: Modeling for Industry]
Course 2E – Modeling for Education

Modeling Educator Certificate (MEC) – Big Ideas

- **Value** of modeling in the teaching and learning of mathematics (STEM).
- Facilitate student **engagement** with the modeling process.
- **Integrate** modeling into the curriculum.
- **Communicate** the curricular/ pedagogical implementation of modeling and its educational value.
Course 2A – Modeling for Industry

Modeling Analyst Certificate (MAC) – Big Ideas

• Value and limitations of modeling to solve real-world problems.
• Modeling mindset to solve industry-related problems using the modeling process.
• Modeling in a problem-solving team within industry.
• Communicate the benefits and results of modeling.
Certificate in Modeling

• Join the Interest Roster:

Link: https://forms.gle/N7UoUj5EvCGAdNsw9
Resources at www.comap.com

Kathi Snook
Resources at www.comap.com

- Free Materials
  - GAIMME Report – COMAP & SIAM
  - BioMath
  - PS-Future
  - MATHmodels.org

- Publications
- Contest problems from past years.
FREE Materials

• GAIMME (English and Spanish)

• A Course in Financial Mathematics

• PS-Future

• Consortium Magazine

• BioMATH
• Find all contest problem statements and access all COMAP webinars.

• MATHmodels.org membership option offers access to student contest papers, commentaries, contest articles, and additional resources.
Publication Examples

• The Mathematical Modeling Handbook
  • Parts I and II

• Discrete Math: Modeling Our World
  • And other MOW courses

• UMAP Journal (4 issues/year)
  • 2 focus on contests: MCM and ICM
COMAP Information and Contact

• For the most up-to-date information about COMAP and our mathematical contests.
  • Follow us on Twitter @COMAPMath.
  • Check out www.comap.com.
  • Reach us by email at info@comap.com.
• Contact panelists - more information – questions: Contact us at info@comap.com.
Questions/Discussion

Please enter your questions into the Chat or raise your hand.

Thank you for attending our All Things COMAP Session