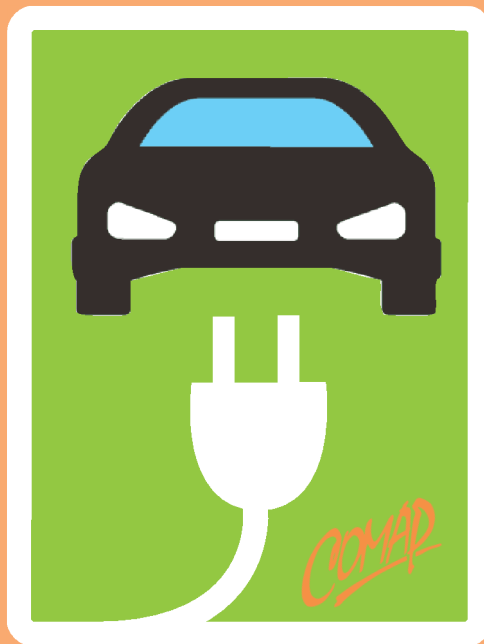


# 2019 MCM/ICM<sup>®</sup> Call for Entries January 24–28, 2019



[www.mcmcontest.com](http://www.mcmcontest.com)

#### The MCM and ICM Contests are Sponsored by:

- The Institute for Operations Research and the Management Sciences
- The American Statistical Association
- The Society for Industrial and Applied Mathematics
- The Mathematical Association of America
- The Department of Defense Analysis, Naval Postgraduate School
- Two Sigma Investments:

A group of experienced, analytical, and technical financial professionals based in SoHo, New York, building and operating sophisticated quantitative trading strategies for domestic and international markets. The firm is successfully managing several billion dollars using highly automated trading technologies. For more information about Two Sigma, please visit our Website at [www.twosigma.com](http://www.twosigma.com).

# MCM<sup>®</sup>

Dear Colleagues:

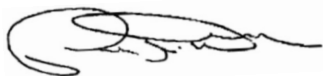
The Mathematical Contest in Modeling (MCM) is the world's largest team-based, international contest for undergraduate college and secondary school students, and certainly one that has achieved and sustained a phenomenal balance in gender participation (42% female, 58% male). On 24-28 January 2019, the MCM will hold its 35th annual contest. Last year, 10670 teams from 1087 institutions in eighteen countries/regions participated in the contest, marking 2018 as the largest participation in MCM since its inception in 1984. Teams often represent a blend of disciplines across departments, intended to leverage a diversity of academic skills to bring to bear on the myriad of stated and implied requirements posed by each unique problem.

Although all teams have an advisor (who could be advising more than one team), teams are on their own once the contest starts. Teams select one of three challenging real-world problems, each of which requires team members to carefully plan and conduct supporting research, make modeling decisions, and correctly apply appropriate mathematical methods to create and revise math models to solve the posed problem. All teams must then craft a complete 20-page technical report summarizing their effort, answering specific problem questions, and sharing insights related to the modeling environment and selected problem. This is truly peer learning and skill development at its best, and all within a short 96-hour time period!

The attached contest overview describes general contest rules and requirements for participation. For more information regarding ongoing and past contests, please visit [www.mcmcontest.com](http://www.mcmcontest.com), or send your questions via email to [mcm@comap.com](mailto:mcm@comap.com).

If you think you might enjoy a challenge that will stretch your team's academic skills in a manner that replicates quick-turn problem modeling and analysis common in commercial and industrial settings, then I hope to see your team in the 2019 MCM!

Best Wishes,



Patrick Driscoll, Ph.D. Contest Director

# ICM<sup>®</sup>

Dear Colleagues:

The Interdisciplinary Contest in Modeling (ICM), an international contest for high school students and college under graduates, will hold its 21st annual competition in January 24-28, 2019. Last year, 9932 teams from 924 institutions in sixteen countries/regions participated in the contest. The ICM is designed to develop and advance interdisciplinary problem-solving skills as well as competence in data analysis and written communication. This year there will be three ICM problems to select from: one will focus on operations research/network science, the second on environmental science, and the third on policy. You can specifically build and prepare your team to tackle one of these topics, if you so choose. Each team must have an advisor (faculty or student), who could be advising more than one team. Your institution can be a part of the ICM effort by promoting participation from within and across departments. Advisors help organize the teams, distribute contest materials, and insure solution papers get to COMAP on time.

Please take a moment to read this Contest Overview, then go to [www.mcmcontest.com](http://www.mcmcontest.com) for more information about ICM history, registration, deadlines, and contest rules. All registration will take place online. If you have any questions please contact [icm@comap.com](mailto:icm@comap.com).

We hope that you and your team(s) will enjoy this modeling challenge.

Best Wishes,



Chris Arney, Contest Director

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## Contest Director

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U.S. Military Academy, NY

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COMAP, Inc., MA

## Associate Director

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NC

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Yulia Tyshchuk  
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Kathryn Coronges  
Northeastern University, MA

Amy Richmond  
U.S. Military Academy, NY

# Contest Overview

**MCM and ICM are parallel contests and follow the same rules.**

**All the information listed below, except where noted, pertains to both contests.**

## The Ground Rules

**Contest Date and Time:** The 2019 contests must be accomplished at a local facility starting at 5:00 PM EST on Thursday, January 24, 2019 and ending at 8:00 PM EST on Monday, January 28, 2019.

Advisors must ensure that no further modifications, enhancements, additions, or improvements may be made to the team's solution paper after the contest deadline. (8:00 PM EST on Monday, January 23, 2019.)

Each team is required to submit an electronic copy of its solution paper by email to [solutions@comap.com](mailto:solutions@comap.com). The advisor or any team member may submit this email. **Team papers MUST be received at COMAP by the submission deadline of 9:00 PM EST (U.S.) on January 28, 2019.**

COMAP must then receive your Signed Control Sheet by email to [forms@comap.com](mailto:forms@comap.com) on or before **Monday, February 4, 2019. No school or team member identifying information may appear anywhere except on the control sheet.**

**Contest Materials:** The contest Website ([www.mcmcontest.com](http://www.mcmcontest.com)) contains all the guidelines, requirements, judging criteria, and procedures for the submission of solution papers, including step-by-step instructions.

**No materials will be available in any other form.**

On Thursday, January 24, 2019 at 5:00 PM EST, the contest problems will be posted on the contest Website.

**Advisors:** The role of advisor can be filled by any faculty, staff member, or student at your institution from any department. The advisor will act as the main point of contact for the team.

Advisors may help guide and rehearse the team prior to the beginning of the competition but may not assist the team in any way once the contest begins.

During the competition, students are required to develop all of their modeling, analysis, and writeup without the help of others. Students cannot reach out to any person by any means of communication.

**Registration of Teams:** All teams must register online on or before January 24, 2019, at 3:00 PM EST.

**A \$100 registration fee must be paid at registration online in order to participate.**

The MCM and ICM contests allow **unlimited** teams per institution, with **unlimited** teams per department.

Each team may consist of up to three high school or undergraduate students who are enrolled in the same school at the time of the contest.

Team members do not need to be named at the time of registration, but they must be determined before the contest problems are posted.

**Contest Problems:** Teams will choose any of six modeling problems:

- MCM Problem A (continuous)
- MCM Problem B (discrete)
- MCM Problem C (data insights)
- ICM Problem D (operations research/network science)
- ICM Problem E (environmental science)
- ICM Problem F (policy)

Data, if needed, will be attached to the problem or available on the contest Website.

Sample problems from other years are online at [www.mathmodels.org](http://www.mathmodels.org)

**The Report:** Participants may use all the resources available such as computers, libraries, software packages, Internet, or any other inanimate sources.

Problems are designed to be open-ended and are unlikely to have a unique solution.

Attention must be focused on clarity, analysis, and design of the solution.

The narrative section of the solution papers must be typed and in English. Partial solutions may be submitted for judging.

**Results:** Judging will be completed by April 30, 2019.

Team solutions will be designated as Disqualified, Unsuccessful, Successful Participant, Honorable Mention, Meritorious, Finalist, or Outstanding.

The results will be posted on COMAP's Website.

Certificates and press releases will be mailed or emailed by May 2019.

Select outstanding teams will have their solution papers published in *The UMAP Journal* and on the website [www.mathmodels.org](http://www.mathmodels.org)

**Prizes:** International COMAP Scholarship Award will be awarded to the four(4) top MCM/ICM teams from any of the participating countries/regions; \$9000 being split among the team members and \$1000 to the school represented. Awards will be announced on or before April 30th each year.

The Institute for Operations Research and the Management Sciences (INFORMS) will designate a single Outstanding team from each of the six problems as an INFORMS winner.

The American Statistical Association (ASA) will designate one Outstanding Team from MCM problem C as a ASA winner.

The Mathematical Association of America (MAA) will designate two Outstanding Teams from MCM as a MAA winner.

The Society for Industrial and Applied Mathematics (SIAM) will designate one Outstanding team from MCM Problems A and B as a SIAM winner.

## Recent MCM Contest Outstanding Teams

Army Medical University, China  
Beihang University, China  
Beijing Forestry University, China  
Beijing Normal University, China  
Beijing University of Technology, China  
Harbin Institute of Technology, China  
North China Electric Power University Baoding, China  
Peking University, China  
Shanghai Jiao Tong University, China (2)  
Shanghai University of Finance and Economics, China  
University of Colorado Boulder, CO, USA  
University of International Business and Economics, China  
Virginia Tech, VA, USA  
Xi'an Jiaotong University, China  
Zhengzhou University, China

## Recent ICM Contest Outstanding Teams

Beijing University of Technology, China  
Ludong University, China  
Nanjing University, China  
Nanjing University of Information Science & Technology, China  
Peking University, China  
Shanghai Jiao Tong University, China (3)  
Shenzhen University, China  
Skidmore College, NY, USA  
Tianjin Polytechnic University, China  
Tsinghua University, China  
University of Electronic Science and Technology of China, China (2)  
Xi'an Jiaotong University, China  
Xidian University, China  
Zhejiang Sci-Tech University, China