

MCM/ICM

Contest Rules, Registration and Instructions

(All rules and instructions apply to both ICM and MCM contests.)

To participate in a contest, each team may consist of a maximum of three students and must be sponsored by a faculty advisor from its institution.

Team Members: A team may consist of up to three students from the same school and is open to all undergraduate and high school students.

Team Advisors: Any faculty, staff member, or student at your institution can fulfill the role of Advisor. The advisor will act as the main point of contact for the team, and does not have to be from the mathematics department. We do however encourage faculty members to serve as team advisors.

[MCM-ICM: Procedures and Tips for a Great Experience](#)

[MCM-ICM: Procedures and Tips for a Great Experience \(Chinese\)](#)

The purpose of this article is to assist and guide students and advisors participating in The Mathematical Contest in Modeling (MCM) and The Interdisciplinary Contest in Modeling (ICM). In the article, COMAP, provides information about the administration of the contests, as well as tips to ensure your contest experience is smooth, satisfying, and enjoyable.

I. BEFORE THE CONTEST BEGINS:

- A. Registration
- B. Choose your team members

II. AFTER THE CONTEST BEGINS:

- A. View the contest problems via the contest web site
- B. Choose a problem
- C. Teams prepare solutions
- D. Print Summary Sheet and Control Sheet

III. BEFORE THE CONTEST ENDS:

- A. Send electronic copy of Solution Paper by email

IV. WHEN THE CONTEST ENDS:

- A. Prepare Control Sheet
- B. Mail signed Control Sheet

V. AFTER THE CONTEST IS OVER:

- A. Confirm that your team's solution was received
- B. Check contest results
- C. Prizes/Certificates

2018 Contest changes/updates can be found in red below:

- MCM/ICM is an all electronic submission!

- You are not required to mail a print copy of your Solution Paper.
- You are not required to mail a print copy of your signed Control Sheet.
- We have added 3 hours to the contest start time to allow for teams to download, read, discuss, and choose a problem. Teams can view the contest problems via the contest web site when the contest begins at 5PM EST on Thursday February 8, 2018.

2018 Contest dates and times:

- Registration Deadline: Before 3PM EST on Thursday, February 8, 2018.
- Contest Starts: 5PM EST on Thursday, February 8, 2018.
- Contest Ends: 8PM EST on Monday, February 12, 2018.
- Email Submission Deadline: 9PM EST on Monday, February 12, 2018.
- Control Sheet Submission Deadline: 5PM EST on Friday, March 2, 2018.
- Contest Results: The results will be posted on April 29, 2018.

IMPORTANT NOTES:

- **COMAP is the final arbiter of all rules and policies, and may disqualify or refuse to register any team that, in its sole discretion, does not follow these contest regulations and procedures.**
- **Decisions of the judges, the contest directors, and the editor of The UMAP Journal are final.**
- **If a team is caught violating the rules, the faculty advisor will not be permitted to advise another team for one year, and the advisor's institution will be put on probation for one year.**
- **If a team from the same institution is caught violating the rules a second time, then that school will not be allowed to compete for a period of at least one year.**
- **All times given in these instructions are in terms of Eastern Standard Time (EST). (COMAP is located in the U.S. Eastern Time zone.)**

By submitting an entry, team members agree that:

- **Their submission and all rights to its publication become the property of COMAP, Inc.**
- **COMAP may use, edit, excerpt, and publish this submission for promotional use or any other purpose, including placing it online, distributing it electronically, or publishing it in The UMAP Journal or otherwise, without compensation of any kind.**
- **COMAP reserves the right to use in materials relating to this contest, the names of the team members, their advisor(s), and their affiliations, without further notification, permission, or compensation.**
 - **and team members assert that**
- **All images, figures, photographs, tables, and drawings in their submission were either created by the team or else, if reproduced from another source, the submission cites a specific reference for each at its location in the submission.**
- **All direct quotations in the submission are enclosed in quotation marks or otherwise identified as such, with a specific reference cited for each at its location in the submission.**

I. BEFORE THE CONTEST BEGINS:

A. Registration

All teams must be registered before 3PM EST on Thursday, February 8, 2018. We recommend that all teams complete the registration process well in advance, since the registration system will not accept any new team registrations after the deadline. COMAP will not accept late registrations for MCM/ICM 2018 **under any circumstances. NO EXCEPTIONS WILL BE MADE.**

1. **Register your team online via the contest web site:** Go to <http://www.comap.com/undergraduate/contests/mcm>.

- a. If you are registering your first team for this year's contest, click on **Register for Contest** on the left-hand side of the screen.

Enter all the required information, including your email address and contact information.

IMPORTANT: Be sure to use a valid and current email address so that we can use it to contact you at any point before, during, and after the contest, if necessary.

- b. If you have already registered a team for this year's contest and want to register a second team, click on **Advisor Login**, then log in with the same email address and password that you used when you registered your first team. Once you're logged in, click on **Register Another Team** near the upper right corner of the page, then follow the instructions there. **There is no restriction on the number of teams an advisor can register.**

2. **Registration Fee**

A \$100 registration fee per team is required.

We accept payment with Mastercard or Visa only via our secure web site. We cannot accept other forms of payment. Our secure site will process your credit card payment, so your credit card number is protected. Our system will not store your credit card number after it processes your payment.

3. After we receive approval from your financial institution (this takes only a few seconds), the system will issue a control number for your team. Your team is not officially registered until you have received a team **control number. Print the page that displays your team control number: It is your only confirmation that your team has been registered.** This page also lists the email address and password that you entered when registering; you will need this information to complete the contest procedures.

You will **NOT** receive an email confirmation of your registration.

4. If you need to change any of the information (name, address, contact information, etc.) that you specified when you registered, you can do so at any point before or during the contest by logging in to the contest web site with the same email address and password that you used when registering (click on the **Advisor Login** link on the left side of the screen). Once logged in, click on the **Edit Advisor or Institution Data** link near the upper right corner of the page.
5. Check the contest web site regularly for any updated instructions or announcements about the contest. Except in extreme circumstances, COMAP will not send any confirmation, reminders, or announcements by email. All communication regarding the contest will be via the contest web site.

6. You will return to the contest web site during the contest to enter and confirm information about your team, and to print/download out your team's Control Sheet and Summary Sheets, which you will use when preparing your team's solution. Details on these steps follow in the instructions below.

B. Choose your team members:

1. You must choose your team members **before the contest begins at 5PM EST on Thursday February 8, 2018**. Once the contest begins you may not add or change any team members (you may, however, remove a team member, if he or she decides not to participate).
2. Each team may consist of a maximum of three students. (Teams may consist of 1, 2, or 3 students).
3. Each student may participate on only one team.
4. Team members must be enrolled in school at the time of the contest, but they need not be full-time students.
5. Team members must be enrolled at the same school as the advisor and other team members.
6. Team members must be enrolled at the same school. (No exceptions will be made).
7. Team members must be undergraduate students postgraduate students are not allowed.

II. AFTER THE CONTEST BEGINS:

A. View the contest problems via the contest web site:

Teams can view the contest problems via the contest web site **when the contest begins at 5PM EST on Thursday February 8, 2018:**

1. The contest problems will become available precisely at 5PM EST on Thursday February 8, 2018; team members can view them by visiting <http://www.comap.com/undergraduate/contests/mcm>. No password will be needed to view the problems; simply go to the contest web site at or after 5PM EST on Thursday, February 8, 2018 and you will see a link to view the problems.
2. The contest problems will become available precisely at 4:50PM EST on Thursday February 8, 2018 on the following mirror sites:
<http://www.comap-math.com/mcm/index.html>
<http://www.mathismore.net/mcm/index.html>
<http://www.mathportals.com/mcm/index.html>
<http://www.immchallenge.org/mcm/index.html>

If you cannot access any of the sites, there may be a problem with your local Internet connection. Contact your local Internet service provider to resolve the issue.

B. Choose a problem:

Each team may choose any one of the six problem choices and should submit a solution to only one problem.

- **MCM problems are Problem A, Problem B or Problem C.**
- **ICM problems are Problem D, Problem E or Problem F.**

C. Teams prepare solutions:

1. Teams may use any inanimate source of data or materials: computers, software, references, web sites, books, etc. ALL SOURCES USED MUST BE CREDITED. Failure to credit a source will result in a team being disqualified from the competition.
2. Team members may not seek help from or discuss the problem with their advisor or anyone else, except other members of the same team. Input in any form from anyone other than student team members is strictly forbidden. This includes email, telephone contact, and personal conversation, communication via web chat or other question-answer systems, or any other form of communication.
3. Partial solutions are acceptable. There is no passing or failing cut-off score, and numerical scores will not be assigned. The MCM/ICM contest judges are primarily interested in the team's approach and methods.
4. **Summary Sheet:** The summary is an essential part of your MCM/ICM paper. The judges place considerable weight on the summary, and winning papers are often distinguished from other papers based on the quality of the summary.

To write a good summary, imagine that a reader will choose whether to read the body of the paper based on your summary: Your concise presentation in the summary should inspire a reader to learn about the details of your work. Thus, a summary should clearly describe your approach to the problem and, most prominently, your most important conclusions. Summaries that are mere restatements of the contest problem, or are a cut-and-paste boilerplate from the Introduction are generally considered to be weak.

Besides the summary sheet as described each paper should contain the following sections:

- **Restatement and clarification of the problem:** State in your own words what you are going to do.
 - **Explain assumptions and rationale/justification:** Emphasize the assumptions that bear on the problem. Clearly list all variables used in your model.
 - **Include your model design and justification** for type model used or developed.
 - **Describe model testing and sensitivity analysis**, including error analysis, etc.
 - **Discuss the strengths and weaknesses** of your model or approach.
5. The judges will evaluate the quality of your writing in the Solution Paper:
 - Conciseness and organization are extremely important.
 - Key statements should present major ideas and results.
 - Present a clarification or restatement of the problem, as appropriate.
 - Present a clear exposition of all variables, assumptions, and hypotheses.
 - Present an analysis of the problem, including the motivation or justification for the model that is used.
 - Include a design of the model.
 - Discuss how the model could be tested, including error analysis and stability (conditioning, sensitivity, etc.).

- Discuss any apparent strengths or weaknesses in your model or approach.
6. Papers must be typed in English, with a readable font of at least 12 point type.
 7. The solution must consist entirely of written text, and possibly figures, charts, or other written material only. No non-paper support materials such as computer files or software will be accepted.
 8. **The Solution Paper must display the team control number and the page number at the top of every page;** for example, use the following page header on each page:

Team # 321	Page 6 of 13
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 9. The names of the students, advisor, or institution should NOT appear on any page of the electronic solution. The solution should not contain any identifying information other than the team control number.
 10. Failure to adhere to any preparation rule is grounds for team disqualification.

D. Advisor Login: Choose a Problem and Print Control Sheet:

After the contest begins at 5PM EST on Thursday February 8, 2018, and while the teams are preparing their solutions, the advisor should:

1. Login to the contest web site (go to <http://www.comap.com/undergraduate/contests/mcm>. Click on **Advisor Login**, then enter your email address and password).
2. If you have not done so already enter the team member names and confirm that each name is spelled correctly. **This determines how the names will appear on the contest certificates. COMAP will not make any changes or reprint certificates for any reason.**
3. Specify the problem that your team has chosen to solve.
4. Print/Download one copy of the Control Sheet.
5. Download or copy the team Summary Sheet. (This should be used as the first page of your electronic email submission.)

III. BEFORE THE CONTEST ENDS:

A. Send electronic copy of Solution Paper by email:

1. Each team is required to submit an electronic copy of its solution paper by email to solutions@comap.com. Any team member or the advisor may submit this email.
 - a. **Your email MUST be received at COMAP by the email submission deadline of 9PM EST on February 12, 2018.**
 - b. Failure by a team to submit a solution via email by **9PM EST on February 12, 2018** constitutes a violation of the contest rules and will result in that team's disqualification.
 - c. No further modifications, enhancements, additions, or improvements may be made to the team's solution paper after 8PM EST on February 12, 2018. Any changes to the solution will constitute a violation of the contest rules and may result in disqualification.

2. In the subject line of your email write: COMAP and your team's control number. For example:
Subject: **COMAP 2222**
3. Use your team's control number as the name of your file attachments.
4. COMAP will accept only a **Microsoft Word or Adobe PDF (PDF is the preferred file format)** of your solution. DO NOT include your Control Sheet, programs or software with your email as they will not be used in the judging process. Limit one solution per email. **The names of the students, advisor, or institution should NOT appear on any page of the electronic solution. Your team's summary should be included as the first page of your file. *Note: The attachment must be less than 17MB. !! Do not use a cloud service such as Google Docs your email must contain a Microsoft Word or Adobe PDF attachment.**
5. See the rules for submitting the signed Control Sheet via email below.

IV. WHEN THE CONTEST ENDS:

A. Prepare Control Sheet:

When the contest ends at 8PM EST on February 12, 2018:

1. Each team member must sign the Control Sheet to pledge that he or she abided by the contest rules and instructions.

**Note you are not required to mail a print copy of your Solution Paper or Control Sheet.*

B. Email The Signed Control Sheet:

1. **Send the signed Control Sheet by email to COMAP:**

After the signed control sheet is prepared, email it to: forms@comap.com. In the subject line of your email write: COMAP and your team's control number. For example: **COMAP 2222**. COMAP will accept only an Adobe PDF or a Photo Image of your control sheet. Limit one set of forms per email. Teams may take pictures of the signed forms with a phone or digital camera and then email the images to forms@comap.com. *Note: The attachment must be less than 17MB.

(Note you are not required to mail a print copy of your Control Sheet.) **!! Do not use a cloud service such as Google Docs your email must contain a Adobe PDF or Microsoft Word attachment.**

The Control Sheet must be received by COMAP no later than 5:00 PM EST on Friday, March 2, 2018. COMAP is not responsible for contest forms received after that date.

V. AFTER THE CONTEST IS OVER:

A. Confirm that your team's solution was received:

1. You may login to the contest web site using the **Advisor Login** link to verify that your team's Electronic Solution was received at COMAP.

B. Check contest results:

1. **Judging:** Judging will be completed in March and the results will be posted on April 29, 2018. The Solution Papers will be recognized as Disqualified, Unsuccessful, Successful Participant, Honorable Mention, Meritorious, Finalist, or Outstanding Winner.
2. We will post the contest results on the web site as soon as they are available, so visit the contest web site regularly to check for updates. It will take several weeks for the judges to evaluate the solutions and for COMAP to process the results. Please do NOT call or email COMAP regarding contest results.

C. Prizes/Certificates:



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

After the results are issued, each successfully participating team advisor and student will receive a certificate of participation. You may login to the contest web site using the **Advisor Login** link to view and print your team's certificates. All international teams will receive ONLY an electronic (PDF) certificate. US teams should allow several weeks after the results are posted to the contest web site to receive your print certificate. [Click here to download MCM/ICM certificates.](#)

- **MCM Awards (Problem A, B and C)**
- The Ben Fusaro Award will be accorded to an especially creative paper and will be chosen from the contest finalists.
- The Frank R. Giordano Award began in 2012. It honors Brig. Gen. (ret) Frank Giordano who directed the MCM for 20 years. This award goes to a paper that demonstrates true excellence in the execution of the modeling process.
- **ICM Awards (Problem D, E and F)**
- The Leonhard Euler Award is presented to a team selected by the head judge of the ICM's Problem D. The criteria are: 1) a paper in the Meritorious/Finalist/Outstanding rating; 2) contains especially creative and innovative modeling; and 3) shows good understanding of interdisciplinary science. The award honors the name of a 18th-century Swiss applied mathematician, who was known for the breadth of his research applications, volume of written work, excellent teaching, and interdisciplinarity.
- The Rachel Carson Award honors an American conservationist whose book "Silent Spring" initiated the global environmental movement and whose work spanned many disciplines concerned with the local and global environments. This award is presented to a team selected by the Head Judge of ICM Problem E for excellence in using scientific theory and data in its modeling.
- Vilfredo Pareto was an Italian scholar, modeler and problem solver, who at various times was an engineer, sociologist, economist, political scientist, mathematician, and philosopher. He

lived and worked in the late 19th and early 20th centuries. The ICM Pareto Award for outstanding modeling in the Policy Modeling problem (ICM Problem F) honors the work and legacy of this famous social science problem solver. In particular for this award, the head judge seeks to highlight a paper that best models the more dynamic and challenging contextual human elements that make simplification or refinement of policy models so difficult.



The Institute for Operations Research and the Management Sciences (INFORMS) is the largest society in the world for professionals in the field of operations research (OR), management science (MS), and analytics. INFORMS has long recognized the importance of involving undergraduate students and faculty in an unscripted process of mathematical modeling whose problems contain many of the modern elements seen by its membership. The MCM/ICM exemplifies these characteristics. Consequently, INFORMS has been an active supporter of the MCM/ICM since its inception.

INFORMS carefully selects and designates a single Outstanding team from each of the six problems - A, B, C, D, E, F - as an INFORMS Outstanding winning team whose modeling and analyses best exemplify the style and content reflected in its membership's professional practice. Each student receives a letter of congratulations from the current INFORMS President and a complimentary one-year INFORMS student membership. Each associated faculty advisor receives a letter of congratulations and appreciation from the current INFORMS President, along with complimentary one-year access to the full suite of award-winning INFORMS journals.



The Society for Industrial and Applied Mathematics (SIAM) will designate one Outstanding team from MCM Problems A and B as a SIAM winner. Each student member of the winning team will receive a cash award of \$500 and three one-year student memberships in SIAM. A certificate for the home institutions will be given to the faculty advisers of the winning teams.



The Mathematical Association of America (MAA) will designate two Outstanding teams from the MCM as MAA winners. Each student member of the winning team will receive a certificate. MAA will partially reimburse teams travel expenses to Math Fest so that they may present their paper.



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