The 2016 International Mathematical Modeling Challenge, IM^{2}C - An Announcement and an Invitation March 16, 2016 – May 9, 2016

Rationale:

The purpose of the IM^{2}C is to promote the teaching of mathematical modeling and applications at all educational levels for all students. It is based on the firm belief that students and teachers need to experience the power of mathematics to help better understand, analyze and solve real world problems outside of mathematics itself – and to do so in realistic contexts. The Challenge has been established in the spirit of promoting educational change.

For many years there has been an increased recognition of the importance of mathematical modeling from universities, government, and industry. Modeling courses have proliferated in undergraduate and graduate departments of mathematical sciences worldwide. Several university modeling competitions are growing and flourishing. Yet at the school level there are only a few such competitions with many fewer students, even amid signs of the growing recognition of modeling's centrality.

One important way to influence secondary school culture, and teaching and learning practices, is to institute a high-level, prestigious new secondary school contest – one that will have both national and international recognition. We have therefore founded the International Mathematical Modeling Challenge (IM^{2}C).

This is a true team competition, held over a number of days with students able to use any inanimate resources. Real problems require a mix of different kinds of mathematics for their analysis and solution. And real problems take time and teamwork. The IM^{2}C provides students with a deeper experience both of how mathematics can explain our world and what working with mathematics looks like.

In the coming years the Challenge, inspired by other major international contests, will consist of two rounds of competition. In the first round national teams will work on a common problem and submit their solutions to an expert panel. Then there will be a second round hosted each year by a different country, in which the national teams present their solutions in person and engage in additional modeling experiences together.

Plans for 2016:

In 2016 our plans call for a contest of only the first phase. We are inviting countries to choose up to two teams of up to four students with one teacher/faculty advisor. The contest will begin in mid-March and end on early-May. During that time teams choose five (5) consecutive days to work together on the problem. All solutions must be sent in by the faculty advisor, who must certify that the students followed the rules of the contest.

Papers will be judged in early June by the international expert panel and winners announced by late-June. Papers will be designated as Outstanding, Meritorious, Honorable Mention, and Successful Participant with appropriate plaques and certificates given in the name of students their advisor and their schools.

On the other side of this flyer you will find the results of the 2015 Challenge, for more information visit www.immchallenge.org

NEWS RELEASE
First Annual International Mathematical Modeling Challenge (IM^2C) 2015

We are pleased to announce the results of the first annual International Mathematical Modeling Challenge (IM^2C). There were 10 countries invited to participate in the 2015 IM^2C and after the national selection round, 17 teams competed in the international round of judging. All teams worked at their own schools during a 5 day period between April 15th and May 15th, 2015. Each team was given a modeling problem and then constructed their solutions. This year's problem Movie Scheduling asked the teams to design a model for the effective filming and production of a motion picture.

Outstanding Teams

- Palo Alto High School, Palo Alto, CA, USA
- Advisor, Radu Toma
    - Eric Foster
    - Kathryn Li
    - Allison Zhang
    - Andrew Lee
- High School of Peking University, Beijing, China
- Advisor, Yaoyang Wang
    - Donghan Wang
    - Haimei Zhang
    - Wanchun Shen
    - Dingding Dong
- Raffles Girls' School (Secondary), Singapore
- Advisor, Samuel Lee
    - Siah Kelly
    - Wang Huaijin
    - Li Anqi
    - Lee Estelle
- Shanghai Nanyang Model School, Shanghai, China
- Advisor, Gao Junxiang
    - Cai Yiyi
    - Chen Zhihao
    - Xiao Zhijun
    - Yan Yijia

All schools are to be commended for their efforts. The judges were impressed with all the teams' creativity and ingenuity in mathematical modeling and in their ability to explain their strategies and problem-solving techniques in clear terms. Each participant is a true winner. A complete Results Report, listing all teams by designation, as well as the full problem statement can be found at www.immchallenge.org. For additional contest information, contact IM^2C at: info@immchallenge.org.

Initial funding for planning and organizational activities was provided by IM^2C co-founders and co-sponsors - The Consortium for Mathematics and its Applications (COMAP), a not-for-profit company dedicated to the improvement of mathematics education and by NeoUnion ESC Organization in Hong Kong.

2015 IM^{2}C Problem

Movie Scheduling

A great deal of preparation must take place before a movie can be filmed. Important sets and scenes need to be identified, resource needs must be calculated, and schedules must be arranged. The issue of the schedule is the focus of the modeling activities. A large studio has contacted your firm, and they wish to have a model to allow for scheduling a movie. You are asked to answer the questions below. You should provide examples and test cases to convince the movie executives that your model is effective and robust.

Question 1:

Develop a model that will produce a filming schedule given the following constraints:

* The availability dates of the stars of the film.
* The time required to film at a list of specific sites.
* The time required to construct and film on a list of sets.
* The availability dates for specific resources. For example a war movie might require helicopters which are available only at specific times.
* Some scenes cannot be shot until after certain computer generated content is defined and other physical items are constructed.

Your schedule must include extra time to allow for redoing some shots if they turn out to be inadequate after editing and review.

Question 2:

Develop a model that will take the information and schedule generated from the first question and can adjust them in the event that some delay in one aspect or the availability of some asset changes. For example, if one of the stars has an accident and cannot film for a certain period of time, you should be able to adjust the schedule.

Question 3:

Use the model developed in the first question to develop a way to determine the most important constraints. That is, identify the constraints that will cause the longest delays if a problem occurs.