

Mathematical Contest in Modeling

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The mathematical contest in modeling will be held in February 8-12, 2007. That's right, it's 96 hours of work. Teams consist of three undergraduate students. Each university can sponsor at most four mcm teams and each department (and advisor) at most two teams. The Math Department will sponsor two teams. We will get Amath to sponsor the other two. I will be willing to serve as informal advisor to all teams, and we will get additional faculty advisors for the other teams. The Math Department will pay the registration fees for all teams.

My website, <http://www.math.washington.edu/~morrow/mcm/mcm.html>, has a lot of local information. Another website, <http://www.math.washington.edu/~morrow/mcm/mcmprep.html>, has more information. The MCM website is <http://www.comap.com/undergraduate/contests/mcm/>. You can find past problems on this site. In addition there are two journals, The UMAP Journal and the journal Interfaces, which you can access from University computers and read on-line. You'll need to get the password from the math librarian for the UMAP journal. You should spend some time reading the UMAP Journal as it has winning papers plus a lot more. There is a website, <http://www.mathmodels.org> with an extensive list of practice problems.

A winning paper has several characteristics.

- It has a precise statement of a mathematical problem that rephrases, at least partially, a vaguely stated question.

- It has a solution of the problem.

Solutions often involve combinatorics, graph theory, discrete mathematics, probability, differential equations, linear algebra, and calculus of one and several variables – mostly second and third year mathematics; and often they involve first or second year physics. It helps to be a double major as you get a good feel for the uses of mathematics and how to deal with uncertainty.

- It has a clear, easily read, exposition of the solution.

- You will need to learn \LaTeX .

An introduction can be found in <http://www.ams.org/tex/short-math-guide.html> or also <http://www.math.washington.edu/Computing/Tex/>. You will get computer accounts at MSCC which give you access to the \LaTeX software.

- It is important that the salient items be highlighted (as with this bullet).

Don't bury important items inside lengthy paragraphs.

- Use graphics and tables to illustrate your points.

That means you need to be prepared with \LaTeX templates in which to include the text and figures. The UMAP journal includes many comments and recommendations by judges. In particular they point out that there are few judges and hundreds of papers. There is a triage system. Each paper is given a quick (5-15) minute reading. You must make the first cut. Then a more careful reading is made. To make

the “finals” your paper must be very good. The judges recommend that you not spend precious space deriving a known mathematical or physical result. Give a reference and proceed. Don’t include computer code; at most include simple pseudo-code. Explain your methods in direct simple terms.

- Be ready to write programs in Matlab. Think of Matlab as a calculator where the data type is a matrix. Lots of documentation is available on-line.
- Use the Internet. You will have to find data and such search engines as Google, CiteSeer, MathSciNet, MathWorld, and are very useful. Martha Tucker made a website <http://www.lib.washington.edu/math/mcm>. with an extensive collection of reference links.

We will arrange for you to have access to the MSCC computer lab in off-hours. This may be a problem if we have four teams, since we need to make sure there is a “firewall” between teams (no communication). If any of you can get access to rooms and computers other than MSCC that will help. As soon as teams are formed, I’ll ask Mike O’Connell to set up computer accounts at MSCC.

Let’s meet again next on Friday, October 20, at 5:00 and go over any suggestions and questions. Also think about how the teams should be formed. Each team should have someone skilled in \LaTeX , at least one with programming skills, all should be able to write well, and there should be a broad base of knowledge. During the contest you will want to divide up duties: one person writing, another computing or working on models, another searching the Internet, etc.

- Next meeting: Friday, October 20, 5:00 in Padelford, C401.