



News from the South C's

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Upcoming Events:

- Oct. 7, 2006—CMC³ Fall Mini-Conference at Cerritos College.
- Nov. 2-5, 2006—32nd AMATYC Annual Conference, Cincinnati, Ohio.
- Nov. 30-Dec. 2, 2006—CMC³ 34th Annual Conference, Monterey, CA.

From the President's Desk

FROM THE PRESIDENT'S DESK:

Greetings! This issue of *News from the South C's* marks the beginning of a new school year and my first opportunity to welcome you as your new CMC³-South president. Forgive me if you were on pins-and-needles awaiting the usual May issue, but the stars were not properly aligned and my astrologer advised me against having one.

I would like to welcome several newcomers to the CMC³-South board. Patty George of Cerritos College is Member-at-Large for the Central region, and Hoat Le of San Diego City College is Member-at-Large for the South region. Our new newsletter editor is Paul Swatzel of Citrus College. Rod Elsdon of Chaffey College accepted our invitation to be the Contacts Coordinator, a new position that we hope will improve communication between CMC³-South and the fifty-seven community colleges that we serve.

The 21st Annual Spring Conference was held last March 4-5 at the Doubletree Hotel in Anaheim. By all measures it was a great success. Highlights included Dan Bennett's amazing comedic juggling act with a heavy mathematical flavor and a keynote address by Gary Lorden, Caltech's math department chair and consultant to the TV show *NUMB3RS*. If you weren't among the 300 people in attendance, you missed a wonderful conference. So get out your Blackberries and input the following: the 22nd annual conference will be held in Anaheim on March 2-3, 2007.

Coming up on Saturday, October 7, is the annual CMC³-South fall mini-conference. "Annual?" you ask. Okay, I concede...we didn't hold the mini-conference last year because CMC³-South was just a little bit busy hosting the national AMATYC conference in San Diego. But all's quiet now on the western front and Cerritos College will be the site of the October 7th mini-conference, entitled "Talking About Math: *Continued on page 2*

From the President's Desk:

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Communicating Mathematical Ideas.” Conference chair Graham Chalmers leads a substantial team of Cerritos College math faculty who have quite an event in store for all of us. Look for more information elsewhere in this newsletter.

I'm planning to attend the 32nd Annual AMATYC Conference in Cincinnati on November 2-5, 2006. I hope I'll see many of you there too. I'm a bit of a conference junkie, so don't be surprised to see me in Monterey on the first weekend in December for the CMC³ conference. Our sister organization in the north has been around even longer than AMATYC, and they always put on quite a shindig. Join me! (More information at www.amatyc.org and www.cmc3.org.)

I wish you health, happiness and a hugely successful semester!

Richard Zucker
Irvine Valley College



A Mathematical Investigation

Here's an interesting mathematical mystery that only requires a little algebra and a curious mind to unravel. You can present it to your students as a mind reading magic trick. Be sure to ham it up!

Ask your students to make up a quadratic function of the form $f(x) = ax^2 + bx + c$. It will be to your benefit if the coefficients are integers, but it isn't necessary. Now have them calculate $f(0)$, $f(1)$, and $f(2)$. Pick a student who can usually be relied on to do arithmetic accurately, and ask her to read her results in order. With appropriate histrionics and a tension-building expectant pause (while you do a little mental arithmetic), you reveal the student's quadratic function to an astonished class. Of course you don't tell them how it's done. That's what earning extra credit is all about!

I won't spoil the fun for you either. Of course it is possible to solve the resulting system of equations with pencil and paper. The real trick is to find a convenient way to do it mentally. Frankly, the method I use strains my short-term memory a bit. Let me know what you invent, or write me for my explanation. I'm at rzucker@ivc.edu. I'd love to hear from you!

Status of the New Math Requirement for an Associate Degree.

After the approval of the new math and English requirements for an associate degree by the statewide Academic Senate, what remains to be decided by the Board of Governors is the timeline for its implementation. The new math requirement will be Intermediate Algebra, or another math course that has Elementary Algebra as a prerequisite.

There is a brand new statewide Student Senate. One of their first actions was to endorse the increased math and English requirements approved by the Academic Senate. This will be a powerful endorsement at the level of the Board of Governors, as they discuss the implementation of the new requirements. The California Community College Trustees (CCCT) and the Chief Executive Officers of the California Community Colleges (CEOCC) have also endorsed the change. Both of these organizations have expressed that they recognize this change as an effort to better prepare California community college students for their success in the workforce. At the same time, the CCCT, CEOCC, and the Community College League have requested the Board of Governors to postpone the implementation of the new requirements until 2009. The CCCT and CEOCC cite several fiduciary and operational issues as rationale for their request for this postponement. The two groups have expressed that the extra time is needed to prepare the changes in curriculum, to develop alternative courses, to identify best practices, and to prepare for the possible initial decline in the number of degrees awarded due to the new prerequisites.

The current proposal calls for implementation in 2008. It is anticipated that the Board of Governors will decide the timeline for implementation of the new requirements at the September 11th meeting.

Ignacio Alarcon
Santa Barbara City College

When Biology Gets 'Quirky,' Scientists Turn To Math

Ohio State University researchers who are trying to solve a longstanding mystery in chemistry and biology are getting answers from a seemingly unusual source: mathematics.

Ultimately, the project could provide a tool for clinical research, because it could explain why cells sometimes react to medicines in unexpected ways.

A chemical such as a drug could function very well inside a cell most of the time, and then suddenly not work well at all, as if a switch had been flipped. For researchers who are trying to develop new biochemical agents, this means that results can vary widely from experiment to experiment.

Martin Feinberg and his colleagues wanted to know why.

Through computer simulations, they discovered that the answer -- mathematically,

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CMC³-South Mini Conference

Please keep a look out for the CMC³-South Registration Form coming to you soon for the CMC³-South Mini Conference, October 7, 2006, at Cerritos College.

Here are some of the highlights.

Mary Clarke and Sally Sestini plan to share work they are doing in conjunction with a Title V grant at Cerritos College, and will share some of the techniques they are using to improve student success. They have been experimenting with a variety of interventions, investigating how the use of student tutors in the class room, and how the use of games and activities may influence student success. They have an abundance of information about the techniques they are using and the results they have found to share.

Robert Brown and Sherri Wilson from Crafton Hills College will discuss and provide some examples of methods for bridging the gap between what causes students' problems and what we seem to be missing in developmental mathematics classes. Sherri Wilson has been working in developmental mathematics for over 25 years, and has been involved in innovative and effective projects at the University of California, Riverside, at the California State University, Pomona, and at Crafton Hills College. Her colleague, Robert Brown, has been recently hired at Crafton Hills College as the **Developmental Studies Specialist and has brought with him many exciting ideas** about how to address problems that developmental students face.

Barbara Illowsky, Mathematics and Statistics faculty member at De Anza College, plans to share with the conference participants the status of raising the mathematics requirement at the community colleges. She plans on helping us determine what this means, and when and how these changes will take place. This session will address questions about the pending change in Title 5. Barbara will provide the most accurate and up-to-date information, as well as share practical resources and examples of curriculum that other colleges have developed to meet the proposed changes.

Wait!!! There are more great ideas for us to share at the October 7 Conference.

Angelo Segalla from California State University, Long Beach, plans to share the nuts and bolts of a free web-based system for dealing with homework. Studies show that web-based homework systems like WeBWork significantly increase the homework completion rate of college mathematics students in general, with high and low achievers spending more time on homework delivered with WeBWork than "average" mathematics achievers. Come to Angelo's session! Attendees will get the opportunity to work with the program on classroom computers.

And ... how do we really know what students know, and how do our students know how to communicate what they know?

Through a project called the Scholarship of Teaching and Learning funded by a grant offered by the Carnegie Foundation, Cerritos College professors Patty George, Mark Hugen, and Mojdeh Nikdel plan to share what they have learned about what students know and about how students

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Mini Conference:*Continued from page 4*

communicate what they know. Using a technique called the “Think Aloud,” students are video-taped solving problems. Researchers, like you, analyze the results observed on the recordings. This is only one of the many techniques explored through the Carnegie Foundation. Pasadena Community College, Glendale Community College, and the College of the Desert are also some of the colleges involved in performing the groundbreaking research performed by the Carnegie Foundation. While some of their results are already available on-line, I look forward to seeing their research presented at the CMC³-South Spring Conference next March.

Conferences are great places for professionals to learn effective, creative, and interesting ways of communicating mathematical ideas. I hope to see you there!

Patty George
Cerritos College

Anyone interested in being a presider for the October 6, 2006 Fall Mini Conference, or the 2006 Spring Conference? If so please contact Sherri Wilson at swilson@craftonhills.edu. Please indicate which conference you would like to preside at.

Passing of Dave Bell

It is with sadness that we note the passing of Dave Bell, long time mathematics instructor at Fullerton College, and one of the founding members of CMC³-South. Dave was one of the 12 members of the steering committee that planned the first CMC³-South conference in 1986. Dave served as Treasurer of the Organization from 1988 to 1992, and Registration Chair from 1994 thru 1998. Dave was responsible for working with the IRS to secure CMC³-South's designation as a non-profit professional organization.

Dave was a respected math instructor who taught at Fullerton College and High School for a total of 43 years. David's dedication and service was also felt in his involvement with the YMCA Men's Club and the American Legion. He regularly attended the AMATYC Annual Conference, and was a consummate professional and a true gentleman. He lived a full, complete and committed life, touching in a positive way all those who came to know him. CMC³-South's Board will be planning a way to celebrate Dave's life and his contribution to the organization at next year's spring conference.

For the Students of CMC³-South
Bob Crise, Crafton Hills College

We wish to congratulate Pasadena City College for finishing 1st among the CMC³-South's colleges that participated in AMATYC's Student Mathematics League; also we wish to congratulate the top three students from our area.

First Place: *Jeong Min Seong* Los Angeles City College *and*
Charley Conley, Fullerton College

(These two were the top students from all Regions)

Third Place: *Trung Tran*, Pasadena City College.

If you would like to bring students to CMC³-South Twenty Second Annual Spring conference, March 2-3, 2007, CMC³-South has ten student waivers (two per college) available to the first ten students who apply by filling out the application below or emailing Bob Crise at rcrise@crafton.sbccd.cc.ca.us or rcrise@craftonhills.edu. Colleges may bring more than two students to the conference, but the students will be required to pay \$45.00 to cover the cost of lunch on the third of March.

CMC3-South's Student Registration Waiver for the Twenty Second Annual Conference (Please print all information legibly!)	
Student's Name	
Student's College	Name of the math instructor responsible for the student at the conference:
	Math instructor's email address:
Please return this form to: Robert D. Crise, Jr. Associate Professor of Mathematics Crafton Hills College 11711 Sand Canyon Road Yucaipa, CA 92399-1799	

BITS AND BYTES

By Sister Rita M Basta, BVM

Here are some excellent math resources as you start the academic year.

Are you interested in math education?

- Join the Association of Mathematics Teacher Educators (AMTE). Membership form can be obtained at www.amte.net
- Peruse CITE, an online, peer-reviewed journal available at <http://www.citejournal.org>. In the online journal, authors demonstrate technologies, video, web links etc about which they are writing.
Read How Students Learn Mathematics in the Classroom published by the National Research Council in 2005; ISBN 0-309-08948-4

Do you want your students to be successful and interested in math?

- Link your math topics to occupations that use the skills you are teaching. You can do so at: www.bced.gov.bc.ca/careers/aa/lessons/math.htm
- Look at Classroom Resources, a collection of lessons, web resources for teacher, students, and parents. Most of these extensive resources come from the National Science Digital Library. URL: <http://www.nsf.gov/news/classroom/>
- [Nces.ed.gov/NCESKids/CRUNCH/challenge.asp](http://nces.ed.gov/NCESKids/CRUNCH/challenge.asp) provides a monthly fun problem on math and statistics. Students of all ages will enjoy its multiple links.

Would you like to add to your own professional development?

- Read, FOCUS, the news magazine of the Mathematical Association of America (MAA). It is published nine times a year. Copies can be downloaded at www.maa.org/pubs/focus.html
- Spend some time looking at the National Curve Bank website. The curves and commentaries are not only fascinating but useful in the classroom. The URL: <http://curvebank.calstatela.edu/home/home.htm>
- Enjoy reading Convergence, a new online mathematics history magazine. URL: <http://convergence.mathdl.org/>

BITS or BYTES are welcome for next Newsletter. Please email: rita.basta@csun.edu

Biology:*Continued from page 3*

at least -- could come down to the rate at which chemicals enter a cell. The results of their simulations appear in a recent issue of the Proceedings of the National Academy of Sciences (PNAS).

Feinberg, the Richard M. Morrow Professor of chemical engineering and professor of mathematics at Ohio State, and Gheorghe Craciun, formerly of Ohio State's Mathematical Biosciences Institute, created visualizations of chemical reactions called species-reaction graphs ("species" are the different chemicals in a reaction). The graphs are maps of a sort, where lines and curves connect chemicals like roads connect destinations. Craciun is now an assistant professor of mathematics and biomolecular chemistry at the University of Wisconsin.

Based on the number of connections and how they overlap, Feinberg and Craciun can tell with a glance whether a reaction is predictable, or whether it might be what they call "quirky" -- prone to the switching behavior that occasionally produces strange results. They created a theorem that lays out mathematical rules that researchers can use to make the same judgment.

As it turns out, many of the graphs that describe biological reactions are quirky.

"Some of the graphs that come from classical biological reactions -- even simple ones -- indicate that these reactions might behave in very quirky ways," Feinberg said.

"This behavior may be essential to biology itself."

To test the theorem, he and his colleagues simulated a very simple chemical system on a computer: the behavior of a simplified biological cell containing an enzyme, DHFR (dihydrofolate reductase). DHFR is important in cell division because it helps provide an essential building block of DNA.

In fact, a classical chemotherapy agent, methotrexate, is used to thwart the operation of DHFR so that the out-of-control cell proliferation characteristic of cancer cannot take place. "Some of the graphs that come from classical biological reactions -- even simple ones -- indicate that these reactions might behave in very quirky ways," Feinberg said. "This behavior may be essential to biology itself."

Student Yangzhong Tang created the simulation software as part of her doctoral work. She described it as a simple computational tool which shows how rapidly DHFR converts reactants to products, depending on the rate at which reactants enter the cell. In particular, the software helps determine circumstances under which DHFR can operate in two very different conversion modes -- a rapid one and a slower one.

For the simulation, the researchers started with a low supply rate of reactants and then gradually increased the supply rate. At first, the DHFR converted reactants to

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products at 95 percent efficiency. Then, it abruptly dropped to 65 percent. When they decreased the flow rate, it just as abruptly returned to 95 percent.

"It was like a switch had been flipped, and the trigger was an increase or decrease of only 0.02 milliliters of reactant solution per minute," Feinberg said. "We were surprised to see that we could create such a dramatic switch just by changing the reactant supply rate a tiny amount.

"Keep in mind that this is in the absence of any methotrexate at all," he continued. "To understand what happens in the presence of the anti-cancer drug, one should be aware of the quirky phenomena that might be exhibited even when no methotrexate is present."

Seeing an unexpectedly low conversion efficiency of an enzyme during a laboratory experiment, scientists might erroneously conclude that there's something wrong with the enzyme or that the gene responsible for manufacturing the enzyme had gone awry. In fact, the real culprit might be a chemical switch, intrinsic to the mathematics, that is triggered by the reactant supply rate, Feinberg said.

The next step for the researchers is to try to observe this behavior in the laboratory. They are designing a plastic model cell with specialized filters so that they can carefully measure chemicals that enter and exit.

Several Ohio State professors have been assisting with development of that stage of the project, including Jeffrey Chalmers and S.T. Yang in the Department of Chemical and Biomolecular Engineering and Irina Artsimovitch of the Department of Microbiology.

Even after they do their laboratory experiments, Feinberg says he and his colleagues will be a long way from making any claims about what happens inside real biological cells. Their work implies that scientists should be cautious when interpreting the results of biochemical experiments, nothing more.

Still, he acknowledged that the theorem in the PNAS paper could ultimately help answer fundamental questions in chemistry, biochemistry, and evolution.

"Cells probably need a mechanism to switch readily between states in response to external signals," he ventured. "It could be an evolutionary advantage. So I think biology wants this to happen."

This work was funded by the National Science Foundation.

Source: Ohio State University

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