

Mathematics and Computer Science

Department Newsletter

Department News

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Whew! As the school year rapidly draws to a close, we can stand back, take a deep breath and say “well done!”. Students and faculty accomplished a multitude of curricular and extra-curricular activities. In addition, after an extensive recruiting effort we were fortunate to hire two new faculty who will be joining the department in the fall.

Dr. Carol Bell will join us as an Associate Professor and will teach mathematics education courses beginning with the fall 2007 semester.

Carol comes to us from SUNY Cortland, New York,

where she taught mathematics courses and was the coordinator of the Adolescence Mathematics Education Program.

We are also pleased to welcome Dr. Akhtar Khan, Assistant Professor of mathematics, who along with Dr. Bell will also join us next fall. Dr. Kahn received his Ph.D. from Michigan Tech and will be no stranger to our UP winners!

Akhtar and his family join us from the University of Wisconsin—Barron County, in Rice Lake, Wisconsin, where he taught a wide variety of mathematics courses.

We welcome our new faculty members to the department and look forward to working with them.

Amid the excitement of recruiting, interviewing and hiring, our faculty continued to win awards, serve on committees, host contests, teach classes, advise students, and write, publish, and present papers at conferences world-wide.

Several of our students also had the opportunity to travel abroad to present their research while others presented their work at university venues.

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Opportunities for Students

Our last department newsletter (Winter 2006) touched briefly on the opportunities afforded our students by the generosity of many of our readers. This year was no exception and once again a thank you is in order. Contributions to the NMU Foundation (formerly the NMU Development Fund), *designed specifically for “Mathematics and Computer Science”*, assure us that our students will have unique educational opportunities that will make their NMU

experience memorable. Student trips to the Argonne National Symposium as well as the MCTM Spring Conference allow our students to attend seminars on specific topics, present their research and share ideas with their peers. Our student-run Annual Programming Contest is an opportunity for our students to host and participate in a problem solving contest using their mathematical and computer science skills in an exciting competitive

atmosphere with students from other universities. These opportunities, and others, were possible again this year because of the generosity of alumni and friends of this department.

Student travel and activities have been mentioned in previous newsletters and have been available to our students through contributions to the NMU Foundation. The following is a synopsis of some of our annual student activities.

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The Mathematics and Computer Science Newsletter is published once a year for alumni and friends of the Mathematics and Computer Science Department.

Winter 2007

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2006 Excellence in Teaching

In November, 2006, Ms. Gwen Hetler was awarded the *2006 NMU Excellence in Teaching Award* after being nominated for the honor by her peers.

For 20 years, Gwen Hetler has consistently demonstrated excellence in teaching, especially with at-risk students. Her schedule is filled with "090" and "100" classes, in many ways the most challenging courses to teach since her students lack adequate preparation, have a history of failure in previous mathematics, and usually display low motivation and lack of self-confidence in mathematics. Prof. Hetler is dedicated to providing students with every opportunity and goes to great lengths to support them, spending countless hours preparing instructional materials, scheduling extra help sessions, and always seeking more-effective strategies to reach students. She phones and sends e-mail to strug-

gling students, contacts advisors, completes early-feedback reports, and gives personal attention to each student. She also serves as



unofficial mentor to many adjunct faculty who teach these classes, generously sharing her experience and instructional resources. Student evaluations consistently give high marks, with the words *helpful*, *patient*,

and *thorough* appearing frequently. These are impressive assessments from students whose educational histories are marked with repeated failure in and dislike for mathematics. In addition to her classroom duties, Prof. Hetler is a long-standing member of the All-Campus Student-Faculty Judiciary Committee and the Campus Ministerial Association and of the Departmental Student Affairs and Service Course Committees. She also serves as advisor to freshman probationary students. Prof. Hetler personifies the image of NMU as an institution that cares about its students and is committed to their success.

In October, 2006, Gwen was also honored when she attended the dedication of the new Science Complex at her *alma mater*, Albion College, where the Mathematics and Computer Science Student Research Room was dedicated in her honor.

Math Does Count!!

MATHCOUNTS® is a national math enrichment, coaching and competition program that promotes middle school mathematics achievement and is one of the most successful education partnerships involving volunteers, educators, industry sponsors and students.

Thousands of teachers use the free MATHCOUNTS curriculum materials to supplement classroom materials, as an extracurricular activity and to motivate students to develop strong math skills.

Many of the students who are involved in this program also par-

ticipate in the MATHCOUNTS competition series. Schools select students to compete individually or as part of a team in one of the more than 500 written and oral competitions held nationwide. Top students advance to the state, and ultimately, national level. MATHCOUNTS challenges students' math skills, develops their self-confidence and rewards them for their achievements.

The MATHCOUNTS team in Marquette consists of ten middle school students from three area middle schools. This extracurricular math club is coached by four of our Mathematics Education majors; **John Larson, Christine Lamberti, Diana Moyle and Stephanie Gage** along

with math professor Dr. David Buhl. In a recent regional competition, the team captured 3rd place with two students placing in the top ten in individual competition. One student also earned a berth in the state competition in March, 2007.



Secondary Education Mathematics majors
Diana Moyle, Stephanie Gage, John Larson, Christine Lamberti

Outstanding Students

Outstanding Graduate Student

Brent Sauve

Brent Sauve is a NMU alumnus who returned to earn his master's degree. After graduating magna cum laude with a major in secondary mathematics education and a minor in computer science, Brent Sauve taught at Nah Tah Wahsh Public School Academy before joining the faculty of Escanaba Senior High where he now teaches mathematics and co-advises the National Honor Society. Brent has been a co-presenter at a Michigan Council of Teachers of Mathematics statewide conference. He has co-authored a section of a book for educators of Native American students and is currently working on a mathematics education project that he hopes to publish in the future. He has been nominated by his students for the National Honor Roll of Outstanding American Teachers and has been cited in a published mathematics book for his original solution to a problem.



Outstanding Graduating Senior

Mark Henrion

Mark Henrion is a truly outstanding graduate who is currently doing his student teaching in mathematics and physics at a high school in Germany. Mark's contributions to NMU and the community include his participation in the Student Leader Fellowship Program and his service as mentor to at-risk youth through the Marquette Department of Child and Family Services and as a volunteer coach for Bothwell Middle School's Math Counts program and their LEGO robotics team. He has been a patient and understanding tutor in NMU's mathematics help center and a tutor-counselor for high school students in the NMU Upward Bound Mathematics and Science Program. Mark is a NMU Hardin Scholar and was one of five mathematics education students statewide to be honored in 2006 with a scholarship from the Michigan Council of Teachers of Mathematics.



Other Outstanding Students in Mathematics and Computer Science

This year we were fortunate to have a number of talented students to consider while searching for our outstanding graduating senior. Although mathematics education major Mark Henrion was ultimately chosen, computer science and mathematics also had noteworthy nominees for this honor.

Ruth Bunce will graduate in May, 2007, with a degree in Applied Mathematics and a minor in Computer Science. When she is not in class or busy mulling over homework, she spends time with her daughter, Megan.

After graduation, Ruth and her family will remain in the Marquette area for another year while her husband finishes his degree. Ruth would like to enter a master's program by the fall of 2008.

Paul Cornwell will also graduate in May with majors in Computer Science and (General) Psychology, and a Mathematics minor. Shortly after graduation he will attend Michigan State University as a Ph.D. student with a 5-year University Distinguished Fellowship. He will be working in the Embodied Intelligence Lab.

During his seven years at NMU Paul was involved with the student chapter of the Association for Computing Machinery and worked at the University's Helpdesk.

*Missed one? No Problem. Read all of our past newsletters at
<http://math.nmu.edu>*

High-Performance Computing

by Kristi Evans, NMU News Director

Northern's new supercomputer lab will enable faculty and students to split large tasks into smaller pieces that can be run simultaneously on multiple processors, achieving faster results.

"Parallel processing is not a new concept, but we now have nine boxes, or the equivalent of 18 computers in a small space," said **Dave Powers** (Mathematics and Computer Science). "That means we can run programs 18 times faster than if you used a single computer. The applications for this extend beyond math research and instruction. It can be used for any of the sciences that require high-speed computing. Simulations that used to take days could be completed in half a day with this system."

A single computer once filled a large room. Now, clusters of computers can fit in the same space and drastically reduce processing time. Powers said the largest parallel processing site in the world, to his knowledge, is at the Lawrence Livermore National Laboratory, which is operated by the Univer-



sity of California for the U.S. Department of Energy.

"It has one cluster of 131,000 computers tied together. It's amazing because they all have to communicate with one another. They're predicting that in the future, it might be possible to put a cluster on a single chip and plug that into one box."

Powers spent the fall semester installing the software and obtaining benchmarks to ensure that Northern's new "catCluster" was operating correctly. Computer science classes are using the lab this semester and Powers has already fielded faculty requests to use the cluster for research.

Ahhh, Retirement!!

"Eventually I suppose I will die like everybody else does, but there is a lot to do before that happens so I'd best get on with it!"

-John Kiltinen

Donald Zalewski, professor of Mathematics Education, retired on July 31, 2006, after 26 years of service to this department.

Shortly after retiring, Don and Rita moved to Stephens Point, Wisconsin, where they are closer to family and out of the snow belt. Don is enjoying retirement and spends time helping with household chores, reading, and being outdoors: hiking, doing lawn work and, of course, fishing!

Don and Rita are enjoying their first granddaughter, Sofia, and will spend much of the summer at their cottage on Lake Michigamme, Michigan.

Jane Jamsen officially retired on May 1, 2005, after teaching mathe-

tics and mathematics education courses at Northern for 29 years.

Since her retirement, Jane and Rich have been on the road. In 2005 they traveled to Texas and Florida and spent a month in Italy. They cruised the southwest in 2006 and have just returned from a 5-week trip to Kauai, Hawaii, and Australia where they visited their son Chris and his wife, Michelle.

Jane and Rich spend most of their summers in beautiful Copper Harbor, Michigan, where Jane is a lighthouse guide two days a week - now teaching history instead of math!

Professor **John Kiltinen** retired on May 8, 2007, after 36 years of teaching

mathematics classes at Northern.

John will remain involved with the mathematical community, partly through promotion of his math parody songs as well as research and publication projects that will extend beyond retirement. He will continue as a judge for High School Bowl on WNMU-TV and perhaps promote increased interest among kids by developing a web site for practice questions. John and Pauline continue their involvement with Marquette Choral Society and Finnish cultural activities. John is presently involved in producing a Finnish immigrant opera. A festival in Finland would produce it there, and the Pine Mountain Music Festival would produce it here.

Interested in a Graduate Degree?

We offer a Master of Science Degree in Mathematics Education.

Patent Issued to Dr. Horn

Dr. Jeff Horn was issued U.S. Patent No. 7,181,702 on February 20, 2007, for his patent application entitled "System and Method to Solve Shape Nesting Problems." This software patent describes a radically new approach to shape nesting, in which the goal is to cut out as many copies of a particular shape from a piece of material (e.g., stamping car door panels from sheet steel, or cutting gloves from cattle hides). The new approach uses a genetic algorithm (a form of artificial evolution simu-

lated on a computer), to evolve a group of non-competing species, harnessing the natural tendency of species evolution to find and exploit non-overlapping niches (the shapes) on a resource spectrum (the material to be cut), with a minimum of waste (unused material).

The algorithm, "Resource-defined Fitness Sharing" (RFS), has been under development at NMU since 2000, and traces its origins to Professor Horn's dissertation work in the middle 1990s.

Students in CS 326 (Object Oriented Design) are currently implementing RFS in Microsoft's C# programming language for practical applications, while Prof. Horn develops a theoretical analysis of when and why RFS works, and plans are made to develop parallel processing versions of RFS for deployment on the department's new cluster computers (catCluster and breveCluster).

Congratulations!

Student Achievement *by Jeff Horn*

We just received the news that the paper, *A Simulation of Evolved Autotrophic Reproduction*, by Computer Science majors Correy A. Kowall and Brian J. Krent, has been accepted for publication and presentation (as a poster) at the international Genetic and Evolutionary Computation Conference (GECCO), to be held in London in July, 2007. The paper will enter the archival literature as part of an ACM publication.

This is significant for several reasons:

- (1) GECCO is the pre-eminent conference in the field of Evolutionary Computation, conducts rigorous peer-reviews, and has fairly low acceptance rates.
- (2) It is unusual for undergraduates to co-author a paper at GECCO, rare for undergraduates to appear as first authors, and (to the best of my knowledge), unprecedented that undergraduates be the sole authors of a GECCO paper.
- (3) This is the first time, at least for the department's NERL (Northern Evolutionary Robotics Laboratory), that our students have published a paper at a major international conference as sole authors. (Two years

ago, Correy published a paper at a GECCO 2005 workshop, and prior to that Computer Science major James Cattron, co-authored a GECCO 2003 paper with me. Of course we regularly have NERL students present abstracts at the Argonne National Lab's Undergraduate Research Symposium.)

(4) The research behind this paper was led by Correy, who was sponsored by a National Science Foundation REU grant (Research Experience for Undergraduates) administered through the University of Oklahoma.

(5) The massive computation, involving multiple Central Processing Unit-years, was supported by our own departmental cluster computer: The NMU breveCluster, developed and maintained by Computer Science students Brian Krent and Alex Anagnos, running on computers on loan to the NERL from the department's PC lab. (We hope to move the breveCluster to a more permanent home, both in terms of a room and in terms of dedicated machines, someday.)

The kind of research that Correy

and Brian conduct, namely long-term evolution of complex organisms in detail-rich, high-fidelity, 3D simulations, (which is beyond anything in my own research), is only possible through the use of high-performance computer clusters, such as our two departmental clusters, including the new *NMU catCluster* led by Prof. Dave Powers. This paper's publication helps justify our efforts to develop cluster computation here.

Thanks to everyone who has helped us over the last two years, including the faculty who have taught these student researchers, and the department, the College of Arts and Sciences, and the College of Graduate Studies for helping to fund Correy's trip to GECCO 2005, which in turn helped Correy win the NSF REU award.

We hope to find some additional travel funding so that at least one of the two student authors can go to London this summer to present their poster session.

We are very proud of their accomplishment!

Opportunities for students *continued from pg. 1*

Argonne National Laboratory

Each year 300 or more undergraduates from universities throughout the Midwest attend the U.S. Department of Energy's Argonne National Laboratory for their Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics. Many of the students who attend present their research papers and publications to an audience of their peers, Argonne scientists, graduate students and university faculty. In addition to attending presentations of their choice, students participate in tours of the facilities and attend a banquet. An average of 15 students from this department attend the event annually with 4-6 of these students presenting their own research.

Michigan/Minnesota Council of Teachers of Mathematics (MCTM)

The MCTM is an organization of professionals dedicated to promoting the teaching and learning of meaningful mathematics for all students by supporting educators in their efforts to improve mathematics instruction.

The MCTM annual conferences, which our mathematics education

students attend, involve educational sessions of choice, workshops and keynote speakers, with plenty of time for networking with peers. Special events for students who plan on entering the teaching profession are well attended. Our students who attend present their projects which focus on teaching methodologies.

The NMU/ACM Annual Programming Contest

For the past eight years, the NMU student chapter of the Association for Computing Machinery (ACM) has planned and hosted our annual programming contests.

The NMU-hosted programming contest is designed specifically for college students and has had as many as 24 teams from five universities participate. In addition to the competitors there are programmers, runners, judges, and tech support people who are also involved in the smooth running of the event.

For this contest, students organize themselves into teams of three players. Each team is given a computer (but no Internet access) and five hours to solve six problems using their mathematical and computer science skills. The team with the most points

at the end of the contest wins. Ties are broken in favor of the team that solves the problems in the least amount of time. Winning teams and schools receive trophies and official certificates and everyone receives a commemorative t-shirt designed by our students. It is always an exciting day which is enjoyed by all.

Whether our students are traveling to other universities to compete or planning and hosting their own programming contest, student involvement in these contests is another opportunity which is made possible through donations designated to this department through the NMU Development Fund.

You can be certain that these and many other opportunities for our students (see Student Achievement on pg. 5, Math Does Count! on pg. 2 and LEGO Robotics in the Winter 2005 issue) will continue by sending your contributions directly to the NMU Foundation with the notation "*Mathematics and Computer Science.*"



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Department News continued from pg. 1

Travel was the word around the department this past year as students and faculty had exciting opportunities for a little globe-trotting.

- Jeff Horn attended the *Institute of Electrical and Electronic Engineers Symposium Series on Computational Intelligence* (IEEE SSCI 2007) in Honolulu, Hawaii.
- Computer Science majors Ben Depew and Erin Jensen participated in the *Second Annual International IT Seminar for Students* in Copenhagen, Denmark. Students from Spain, Denmark, Finland and the United States participated.
- Secondary Education Mathematics major Mark Henrion fulfilled his student teaching requirement during the winter 2007 semester in Bamberg, Germany, at Bamberg Middle High School. The school is located on a U.S. Army base.
- Mathematics adjunct faculty Ken Culp traveled to Chihuahua, Mexico, as part of NMU's internationalization initiative to develop a cooperative relationship between NMU and the Universidad Regional del Norte (URN) for the possibility of mutual study abroad opportunities in the future

International travel will continue during the summer as faculty and students attend and present at conferences worldwide.

- Don Faust will attend conferences in Penang, Malaysia and Beijing, China.
- Hal Martin will travel to a conference in Plovdiv, Bulgaria.
- Qinghong Zhang will present his research in Ontario, Canada.
- Jeff Horn, along with two computer science majors, will at-

tend the GECCO conference in London, England. (see *Student Achievement* on pg. 5)

During the school year there were also plenty of travel opportunities 'closer to home'.

- Steve Smith, Randy Appleton, Dave Buhl, Dave Powers, Peggy House gave 11 presentations (as well as a keynote address by Peggy House) at conferences in eight states including Montana, Michigan, Missouri, Minnesota, Nevada, Georgia, Illinois and Wisconsin.
- Andy Poe traveled with fifteen mathematics and computer science students to the *Argonne Symposium for Undergraduates in Science, Engineering and Mathematics* in Argonne, Illinois. This year five students presented their research at the conference.
- Five Secondary Education Mathematics majors attended and presented their work at the *Minnesota Council of Teachers of Mathematics Spring Conference* in Duluth, Minnesota. The students were accompanied by David Buhl and Steve Smith who gave their own presentations at the conference.
- Six computer science students, along with advisor Andy Poe, traveled to the campus of Lake Superior State University in Sault Ste. Marie, Michigan, where they participated in the *ACM North Central North America Regional Programming Contest*.

But why travel when you can attend a conference and present your talk right from your office?

- In December, David Powers participated in the *International Joint Conferences on Computers, Information and Systems Sciences, and Engineering (CIS²E 06)*. This was a virtual conference. Dave had a microphone attached to his laptop and was able to participate by showing his power-point presen-

tation from his office in Marquette to a worldwide audience of registered attendees.

All in all it was another productive year with 10 faculty giving 19 talks at 21 conferences in the United States and abroad. Five faculty had 22 papers published in mathematical journals, conference proceedings and on-line journals.

On Campus

In March, Andy Poe and the student chapter of ACM (Association for Computing Machinery) held the 8th Annual Programming Contest—their most successful to-date! Sixty-eight students on 24 teams representing five schools participated in a day of food, fun and problem solving. NMU's "Smarties" took 4th place team honors and NMU was the 2nd place school.

Another successful Mathematics and Computer Science Colloquium and Seminar Series came to a close in April. During the 2006-2007 school year, nine faculty, three adjunct faculty, and 11 students participated. We also hosted outside speakers from State University of New York, Central Michigan University, University of Wisconsin, Wayne State University and the University of Texas-Pan American.

The Colloquium Committee will host the MAA (Mathematical Association of America) Upper Peninsula Fall Regional Meeting. The two-day event will be held on October 5-6, 2007, on the campus of NMU. Guest speakers will be Dr. Donald Saari, University of California, Irvine, and Dr. Randall Pruim, Calvin College. A number of contributed talks will round out the program. The public is invited.

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Where a mathematical reasoning can be had, it's as great folly to make use of any other, as to grope for a thing in the dark, when you have a candle standing by you.

*- John Arbuthnot
1667-1735*

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<http://math.nmu.edu> and click on the
Alumni Welcome Center button.



E-mail us anytime at math_cs@nmu.edu or visit us at <http://math.nmu.edu>