

Fall 2003 Newsletter

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UNO Student Figures His Way Into Math Elite

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BY KRISTY WRIGHT
WORLD HEARLD STAFF WRITER

The University of Nebraska at Omaha is officially on the mathematics map. For the first time, a UNO student has earned honorable-mention status in the prestigious William Lowell Putnam Mathematical Competition.

Andrew Gacek, a junior math and computer science major, scored in the top 2 percent of the test-takers. That's no consolation prize considering that some mathematicians call the Putnam the "world's hardest math test" taken by the "most brilliant" of American and Canadian college students. "You have to have focus and patience," Gacek said. "You're in there for a while with whatever you have in your head. Nothing else."

In all, 3,349 students from 476 colleges and universities in Canada and the United States participated in the competition last December, individually and as part of teams. The results were released earlier this month. Nine UNO students took the test. Gacek, Eric Manley and Hing Lim Chan formed a UNO team that scored in the top 15 percent.

The usual suspects - math wizards from MIT, Harvard and Duke Universities - earned Putnam Fellowships, given to the five highest-ranking individuals. Harvard won the team competition; Princeton placed second.

So how does UNO compete with MIT and Harvard?

The Walter Scott Scholars program lured Gacek, of Minnesota, to UNO's College of Information Science and Technology. Gacek said he was excited to be a part of the new Peter Kiewit Institute. "I liked the opportunity to help this program come alive," he said. Gacek took the Putnam test as a freshman and sophomore and said that helped him this time around. He attempted and correctly

From The Chair

The UNO Mathematics Department continues to grow in size, quality and scope of mission. Andrew Gacek, now a senior, will soon be taking the Putnam exam for the fourth time, and he is already in the top two percent of test takers nationally! Our new faculty position, created as an NU system-wide priority, was filled last Spring by "Slava" Rykov, an international expert in coding theory and DNA computing. Valentin Matache, winner of the Alumni Outstanding Teaching Award for 2002-2003, epitomizes our dedication to quality teaching for our students. External research funding is increasing. Griff Elder has an NSF grant for studying Galois Structures. Jim Rogers has an NIH grant for studying mathematical models for cell signaling. (Both of these grants were described in last years newsletter).



Andrew Gacek

solved six of the 12 problems.

In 1983, Boston lawyer William Lowell Putnam started the test as a friendly intercollegiate math competition. Nobel Prize-winning physicists Kenneth Wilson and the late Richard Feynman were past winners. Three other winners have gone on to receive the Fields Medal, a mathematician's highest honor.

A three-professor committee spends months thinking up the problems, arranged in order of increasing difficulty. Problems are sort of like the mother of all mathematics story problems, said Griff Elder, an associate mathematics professor at UNO. Solutions require a great understanding of mathematical concepts and analytical and creative thinking.

"The Putnam does not try to measure mathematical knowledge," said Leonard Klosinski, director of the competition and a math professor at Santa Clara University in California. "What it does test is the ability to solve very challenging problems in a fixed period of time. Students who do well are mathematically gifted, very quick and highly creative."

The test takes all day, with two three-hour sessions. "It seems like a rough way to spend a day," Elder said. "But for the people who like puzzles, it's like spending the day reading a good book. It's beautifully captivating, and you can get swept away."

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Recently UNO has received an NSF STEP grant to increase majors in all areas of science, including mathematics. Our high school level Problem of the Week activity has over a hundred participants this semester. We are conducting a dual enrollment pilot project with Millard Public Schools this year for their AP BC Calculus course. Other initiatives are just getting started and will be described later.

Jack Heidel

"Le coeur a ses raisons qui le raison ne sait pas"

Blaise Pascal, 1623-1662



News of Recent Graduates

December 2002

Deborah Challman (BGS), Doing graduate work in Mathematics and Education.
Doug Deden (MS), Financial Analyst for National Indemnity Co.
Wanting Du (BS).
Nanhee Kim (MS), Ph.D student in Operations Research at UNL.
Janice Sturges (BS), Pursuing a career in actuarial science.

May 2003

Aaron Becker (BA, BS), Taking a year off from school, then will decide between Math and Law.
Andrew Buchan (MA), Ph.D. student in Mathematical Logic at University of Amsterdam.
Douglas Carlson (BGS), Pursuing a career in Geology.
Perry Fox (BGS).
Miao Liu (BA), Planning to study optimization theory in graduate school.
Cecilia Losee (BS), Plans to work in the banking and finance field, possibly with IRS.
Kelly McNamara-Prescott (BS), Currently has a research job at UNMC in material science, will go to graduate school later.
Chris Ramey (BA), Going to graduate school at UNMC and UNO.
Jamie Rankin (BGS), Active duty in USAF.
Linda Rau (MAT), Math teacher at Westside.
Kevin Rief (BS), Working at Frito-Lay.
Lisa Schmidt (MAT), Math teacher at Marion High School.
Gayle Vansickle (BGS), Doing graduate work in education at UNO.
Zachary Voller (BS), Plans to get a Ph.D. in Math and become an aerospace engineer for NASA.
Adam Walling (BS), Currently a GTA in Math at UNO.

August 2003

Misty Allmon (BS), Pursuing a career in teaching Math.
Rob Bennett (MS), Planning to teach Math at the college level.
Mark Church (MS), Pursuing a career in Mathematics and Meteorology.
Heather Cox (MAT), Math teacher in Valley.



Adam Walling in Math/Physics Walk-In Tutor Room.

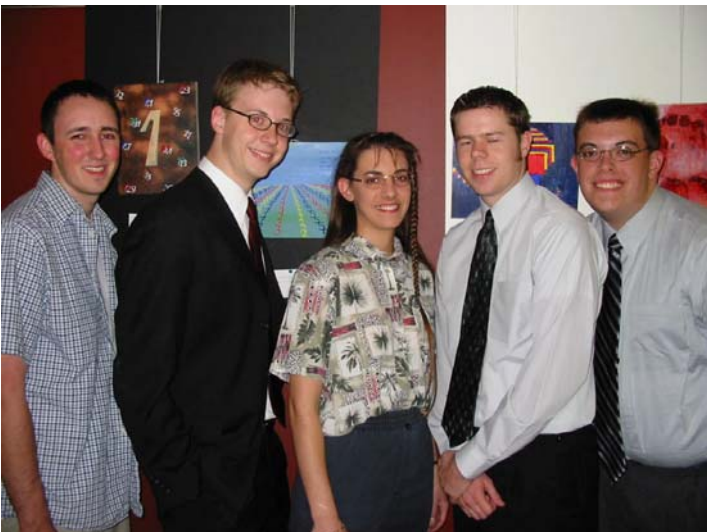
UNO Theatre Presentation of *PROOF*, by David Auburn

THE TONY AWARD AND PULITZER PRIZE WINNING *PROOF* BY DAVID AUBURN will be presented by the University of Nebraska-Omaha Department of Theatre. Performances are November 21 & 22 and December 3-6 with a preview on November 20, in the UNO Theatre, Webber Fine Arts Building, 6001 Dodge Street. Curtain time is 7:30 p.m. The December 3rd performance will be ASL interpreted for the deaf and hearing-impaired. Tickets go on sale November 10th for \$10, \$8, for students/seniors and can be purchased in person or by calling the UNO box office at 554-2335. The box office is located on the first floor of the Weber Fine Arts Building; call for hours.

Faculty member, Dr. Cindy Melby Phaneuf will direct *Proof*. "*Proof* is an elegant piece of work. Seeing it twice may not be enough. It charms you with the complexity interplay of a father and daughter, hooks you on a mystery about a mathematical proof and leads on to the fathomless riddles of family, love, a parent's decline and a damaged child's staggering lurch toward freedom." *San Francisco Chronicle*

"Without any baffling erudition—if you know what a prime number is, there won't be a single line of dialogue you find perplexing—the play presents mathematicians as both blessed and bedeviled by the gift for abstraction that ties them achingly to one another and separates them, also achingly, from concrete-minded folks like you and me. And perhaps most satisfying of all, it does so without a moment of meanness." - Bruce Weber, *The New York Times*

"A proof tells us where to concentrate our doubts"
 Morris Kline, 1908-1992



2003-2004 Earl Scholarship Awardees: Andrew Gacek, Vince Wesselmann, Angela Storm, Eric Manley, Zach Zaiss.

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The Department of Mathematics

2003-2004 Faculty and Staff

Mary Dennison, *Assistant Director-Math Lab*

Parsla Dineen, *Instructor*

Judith M. Downey, *Instructor*

J. Scott Downing, *Professor*

Jerome Drakeford, *Instructor*

G. Griff Elder, *Associate Professor*

Steve From, *Associate Professor*

Margaret Gessaman, *Professor Emeritus*

Jack Heidel, *Chair and Professor*

Doyle Henderson, *Research Technician*

Betty Hickman, *Associate Professor*

John Konvalina, *Professor*

Yi-Hsin Liu, *Professor*

Margaret Mainelli, *Staff Assistant*

John Maloney, *Professor*

Dora Matache, *Assistant Professor*

Valentin Matache, *Associate Professor*

Janice Rech, *Associate Professor,*

Director-Math Lab

Jim Rogers, *Visiting Assistant Professor*

Andrzej Roslanowski, *Associate Professor*

Vyacheslav V. Rykov, *Associate Professor*

Dean Ann E. Saenz, *Special Projects*

Laura Schaben, *Instructor*

Yanxing Song, *Research Associate*

Larry Stephens, *Professor*

Cindy Teller, *Staff Assistant-Math Lab*

Zhenyuan Wang, *Professor*

Vyachevlav V. Rykov

New Faculty Member

Dr. "Slava" Rykov joined the UNO Mathematics Department this fall as Associate Professor of Mathematics. He received his Ph.D. degree in Computer Science from Moscow State University. He formerly served as the Head of the Technology Department of the International Center for Scientific and Technical Information in Moscow. For the past two years, he was in the Department of Mathematics and Computer Science at Huntingdon College in Montgomery, AL. Slava is an international expert in coding theory with over eighty research papers published in a variety of international journals. Recently he has become interested in the new field of DNA computing. He enjoys involving students in his research and they are frequently coauthors on his research publications. In fall 2003, Slava is teaching the senior level course Applied Modern Algebra and also the graduate course Algorithmic Combinatorics. The department looks forward to having Dr. Rykov's involvement in all aspects of departmental life.



Vyacheslav V. Rykov

"Chance favors only the prepared mind"

Louis Pasteur, 1822-1895

Alumni Outstanding Teacher

Dr. Valentin Matache is currently Associate Professor of Mathematics. He received his BA degree from the University of Timisoara (Romania) and Ph.D. degree from the University of Kansas and came to UNO in 1999. He has over 20 years of teaching experience at the junior high, high school, undergraduate and postgraduate levels. He has written 20 research papers and given numerous talks at professional meetings in the general area of operator theory (see his departmental website for more details.). One of Dr. Matache's many contributions to the Mathematics Department has been his sponsorship of Mathematics Awareness Month each April. It consists of a one day symposium on a variety of mathematical topics with talks given by both students and faculty. In April 2002 and 2003, area high school participation was encouraged with on-line and on campus problem solving contests. This has now evolved into a year round on-line Problem of the Week contest with growing numbers of area high school students participating. The department hopes to benefit from Valentin's many contributions for years to come



Valentin Matache accepting the Alumni Outstanding Teacher Award

Mathematics Awareness Month

The UNO Mathematics Department held a one day symposium, on April 2, 2003, to recognize Mathematics Awareness Month. The morning session featured the following talks:

John Konvalina, UNO—Mathematics Faculty
 “Claude Shannon: Mathematician, Electrical Engineer, and Father of Information Theory”

Gary L. Beck, UNO—Mathematics Student
 “Super-Heroic Statistics: A Randomized Study”

Andrew Buchan, UNO—Mathematics Student
 “Cellular Automata and Art”

Valentin Matache, UNO—Mathematics Faculty
 “Three Most Popular Themes on Art and Mathematics”

The afternoon session consisted of a problem solving contest for high school students. Twenty-nine students took a two hour test with five problems. Yuliy Pisetski of Omaha North High School won first prize. The Traveling Trophy was also awarded to Omaha North.



Gary Beck with MAM Statistics Poster.



Judy Downey Supervising High School Problem Solving Contest.

UNO POW Continues

The UNO POW (Problem of the Week) Contest has continued to attract more students. The contest offers problems at two levels. The Rockies problems are designed to be obtainable by students with at least an Intermediate Algebra background and the Himalayas problems are designed to be obtainable by students with at least a Calculus background. In the Fall 2002 and Spring 2003 semesters about 60 different students submitted at least one correct solution in the Rockies division and about 25 different students submitted at least one correct solution in the Himalayas division. Winners in the Rockies Fall 2002 Contest were: Josh Wester, 1st place and Paul Wood, Eric Manley, Frank Mellion and Benjamin Phillips tied for 2nd place. Fall 2002 Himalayas winners were: Andrew Gacek, 1st place, Hing Lim Chan, 2nd place, and Travis Deyle, 3rd place. Winners in the Spring 2003 Rockies contest were: Nam Pham, 1st place, Kent Krause, 2nd place and David Daro, 3rd place.

Spring 2003 Himalayas winners were: Andrew Gacek, 1st place, Hing Lim Chan, 2nd place, and Eric Manley, 3rd place. Here is one of the Rockies problems that was solved correctly by 11 students:

Show algebraically what type of number (natural, integer, rational, or irrational) the following number is:

$$\frac{\sqrt{9-4\sqrt{5}}+1}{\sqrt{5}-1}$$

The answer can be found at the following web-site in Rockies 2 Solution.

<http://www.unomaha.edu/~wwwmath/OurArchive/WPArchive/Fall2002/solR2/solR2.html>

UNO Math Club Becomes MAA Student Chapter

The application has been submitted and approved and the UNO Math Club should appear after the next update of the web-site as a recognized MAA Student Chapter. The UNO Math Club had a very active Fall 2002 and Spring 2003 under the leadership of student officers Steve Bills and Angela Storm. A couple of the highlights of the Fall 2002 semester, were a cryptography talk by John Clark of ITS and Griff Elder of the mathematics department in October, and a game night in November. In the Spring 2003, the group enjoyed listening to John Konvalina of the mathematics department talk on “The Ubiquity of Fibonacci Numbers” and a

panel discussion on careers in mathematics. The panel consisted of UNO graduate Rhonda Ahrens (an actuary), John Sova (an architect) and UNO graduate Richard Schultz (a medical analyst). Activities for the Fall 2003 have included hosting a booth at the UNO Activities Fair in September. Other planned activities for the Fall 2003 semester will include a birthday party for Felix Hausdorff (born on November 8th) and Benoit Mandelbrot (born on November 20th) in November with a talk on their lives and accomplishments by Andrzej Roslanowski of the mathematics department.

Kerrigan Awards for Excellence in Mathematical Writing

Named after Mr. Patrick Kerrigan, BA, UNO 1973, the Mathematics Department has just established two major annual awards in mathematical writing.

A \$500.00 award will be given for the best MA thesis completed in each academic year, beginning with the current year 2003-2004. The departments MA, MS Graduate Program Committee will make the selection based on originality and scope of the topic and the quality of the exposition.

A \$350.00 award will be given for the best undergraduate honors thesis in each academic year beginning in 2003-2004. The Selection will be made each year by the departments Scholarship Coordinator and Honors Program Coordinator.

Mr. Kerrigan, the retired executive vice-president of Informational Technology, Inc., in Lincoln, is a long time benefactor of the UNO Mathematics Department.

Other Prizes in Mathematics:

Undergraduate Problem of the Week

Himalayas (each semester)

First Prize = \$100.00

Second Prize = \$60.00

Third Prize = \$40.00

Rockies (each semester)

First Prize = \$50.00

Second Prize = \$40.00

Third Prize = \$30.00

High School Problem of the Week (annual)

First Prize = \$50.00

Second Prize = \$50.00

Wild Card Drawing = \$50.00

Math Awareness Month On-Site Contest (in April each year)

First Prize = \$50.00

Second Prize = \$40.00

Third Prize = \$30.00

Traveling Trophy (currently held by Omaha North)

UNO/Millard Dual Enrollment Pilot Project in Calculus

In August 2003, the NU Board of Regents approved a dual enrollment pilot project between UNO and the Millard School District for selected academic areas during the 2003-2004 academic year. The Mathematics Department has decided to participate in this project for BC Calculus courses at the three Millard high schools. Millard BC Calculus students have the opportunity to enroll for UNO's Math 1950, Calculus I and Math 1960, Calculus II. Upon successful completion of BC Calculus, they will then receive UNO course credit.

During the current school year, UNO and Millard will be working together to evaluate the success of this project. We will try to measure the extent to which Millard BC Calculus students master the basic concepts of first year calculus as well as do UNO Calculus I and Calculus II students. It will then be decided in Spring 2004, by UNO and the Board of Regents, whether or not the pilot project should be continued or even expanded on a wider basis.

"Mathematics is like checkers in being suitable for the young, not too difficult, amusing, and without peril to the state"

Plato, 429-347 BC

UNO and MCC STEPPing Together

The National Science Foundation has recently awarded a \$2,000,000, five year STEP (Science, Technology, Engineering and Mathematics Talent Expansion Program) grant to UNO in consortium with MCC.

The purpose of STEP is to increase the number of students getting undergraduate degrees in STEM (Science, Technology, Engineering and Mathematics) areas.

UNO and MCC are planning to take a wide variety of approaches to achieve this important goal. First of all, MCC is going to create new Associate Degree options in Mathematics and Science. This will be done in cooperation with UNO to encourage and facilitate the eventual transfer of these students to UNO. MCC will also create "bridge" scholarships to help students make this transfer.

In conjunction with the Goodrich Program, UNO will set-up STEP scholarships to help under-represented and nontraditional students with financial need who wish to major in a STEM area. Twenty to twenty-five students per year will be supported by these scholarships. They will be required to major in one of the UNO STEM areas of Biology, Chemistry, Computer Science, Geology, Mathematics or Physics. A UNO STEM area GTA will be assigned full-time to help recruit, select and mentor STEP scholars.

A Math/Science Learning Center will be established in the Durham Science Center. This will provide walk-in tutoring services for entry level STEM courses. Computer technology services such as internet testing and specialized software instruction will also be provided by the Learning Center.

Several grant supported activities will attempt to provide more hands-on experiences for students. This will, first of all, consist of setting up more internships and cooperative education opportunities for STEM majors. Another STEP supported activity will be early undergraduate research. The idea here is to give beginning STEM majors a taste of what science is all about and to provide them encouragement to persevere during the hard work to come later.

Another component of our STEP approach is high school outreach. MCC proposes to hire a full-time staff member to interact with metro area high schools. At UNO, high school outreach will be focused on an expanded Problem of the Week in Mathematics, which began in Fall 2002. The Computer Science Department will begin a Program of the Month activity aimed at the high school level.

Finally, UNO will create some attractive new interdisciplinary STEM majors in Bioinformatics, Information Assurance, Medicinal Chemistry, and Neuroscience. STEP will help by providing faculty support in developing new courses and focus areas.

The Principal Investigators for STEP are Hesham Ali, Associate Dean of IS&T and Professor of Computer Science at UNO; Jack Heidel, Professor and Chair of Mathematics at UNO; Randy Morrison, Mathematics Instructor at MCC; Michelle O'Connor, Dean of Mathematics/Science and Health Careers at MCC; and Dana Richter-Egger, Assistant Professor of Chemistry at UNO.



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