

Mathematics News

Spring

University of Idaho

2007

An Interview with Monte Boisen



Monte Boisen with daughter, Jennifer

When did you first become interested in Mathematics?

I've always enjoyed mathematics. In elementary school, the penalty for talking too much in class was to do the multiplication tables during recess. I learned my multiplication tables very well. I became really interested when I took an algebra class in middle school and I thought it was pretty neat stuff. In high school I read books like *Mathematics and Imagination* by Edward Krasner, *1, 2, 3 Infinity* by George Gamow, and *The World of Mathematics* (a four volume series). While I found recreational mathematics to be a lot of fun, reading from Newton's *Principles of Natural Philosophy* convinced me that mathematics was the key to understanding the physical world.

What led you to decide to be a Mathematics major?

I became serious about studying mathematics because of a trigonometry course that I took in high school (out of a book by Alexanderson and Hill) in which the trig functions were presented using the complex plane. By approaching the subject this way, you only needed to understand the underlying concepts not memorize a bunch of rules. The elegance of this approach really appealed to me.

Were your parents or siblings mathematical?

No. My parents both earned their high school diploma but neither went to college. My dad enjoyed physics so he did a lot of mathematics in high school in that context and had a lot of respect for mathematics, but did not enjoy the subject. My sister (who is two years older than me) was not mathematically in-

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Fall Graduation



Pictured Left to Right with Monte Boisen and Ralph Neuhaus are some of our Fall 2006 Graduates: Susan Bates-Harbuck, Bryan Klingaman, Katie Daves, Jason Cole and Tim Nadreau.

UI Math Club

The UI Math Club has another great year of events underway. Activities for the fall included playing "Jeopardy" (as in the game show) and learning how to play the strategy game "Go". The big event for spring semester, as usual, will be the Pi Day Celebration and Integration Bee, this year on March 8. It seems that the real "Pi Day" of March 14 is always during spring break!

This year's Math Club Officers are:

Shannon Grant - President
Nicole Hochstrasser - Vice President
Nathan Bialke - Scribe
Tim Karr - Webmaster

The faculty advisor is **MARK NIELSEN**.

You can see Tim's work on our newly redesigned webpage at <http://stuorgs.uidaho.edu/~mathclub>.



clined but was important for my education, because she was the first person in my family to go to college and showed that it was possible.

Where did you go to college? Where did you go to graduate school and why?

In California they had just developed a new system for the state colleges and universities. The idea was that most college-bound students would attend an academically-oriented Junior College for the first two years and then move on to a State College for their junior and senior years. If they were to attend graduate school, they would go to one of the campuses of the University of California. Following that approach, I attended Foothill College and then San Jose State College (now University). The great thing was that tuition was essentially free yet I had the wonderful Stanford and Berkeley libraries available to me. I went to University of Nebraska for my Ph.D.

Why did you choose University of Nebraska...for its football team?

I didn't even know about its football team when I accepted there. I was surprised on my trip to Nebraska when I stopped at a restaurant in Utah and people were lamenting that they had to play Nebraska that year and I thought "Wow they must have a football team." I chose Nebraska because it was not in California, I wanted to move to another part of the country, I was impressed with the description of the math department, it was near where my grandfather lived in western Iowa and that felt comfortable to me and they offered me a teaching assistantship. All of those things contributed to my decision

How did you decide to specialize in Algebra?

I liked Analysis better at first but enjoyed working with a professor (Max Larsen) who was an algebraist and became very interested in that subject area. But I never thought of myself as permanently an algebraist even though my dissertation and early papers were in the area of Commutative Ring Theory, an area devoid of applications to the real world. This moved me away from my mathematical roots that were originally stimulated by Newton's *Principles of Natural Philosophy* and such works. I returned to those roots when I began to work with a mineralogist, Jerry Gibbs, at Virginia Tech. We met because he had questions about some applications of group theory to crystallography. This led me to apply algebra and the theory of optimization to understand the structure and properties of crystals and potential crystals.

Can you describe the research that you do?

Over the last twenty years or so, I have worked on the problem of developing mathematical models that can simulate the environment in which atoms bond, and the effects of those bonds on the properties of a mineral in which they exist. We have also investigated why the structures we see in the mineral world

exist and why others don't, and what structures nature may have missed and what kinds of structures, particularly zeolites, could be artificially created. Zeolites are particularly important as molecular sieves used in the process of refining petroleum products. More recently, I have concentrated on models that can be used to investigate the interaction of water on silicate mineral surfaces. I have also developed algorithms that are able to solve problems related to the integrity of power systems. What has always excited me about mathematics is that it is universally applicable. Knowing mathematics makes you a valuable member of any research team in any field. Because of my strong belief in the value of mathematics, I have become involved in math education and, in particular, in finding new ways to help a broad spectrum of math learners to be successful.

Has there been a particular teacher or professor who has motivated you or that you have especially enjoyed?

Verner Hoggatt at San Jose State was the editor and one of the key leaders in the Fibonacci Association and, while an undergraduate at San Jose State, I was privileged to work with him very closely in putting the journal together and getting involved in the excitement of doing research in this area. In fact, my first published paper was written while I was at San Jose State and appeared in the Fibonacci Quarterly. After getting a taste of the excitement of discovering new mathematical results and sharing them, I was hooked. When I attended the University of Nebraska, two professors really influenced me. Max Larsen, my advisor who invested huge amounts of energy in all that he did and Walter Mientka whose love for mathematics was contagious.

What made you decide to come to the University of Idaho?

I first became acquainted with the University of Idaho when I consulted with the UI Mathematics Department on the project that created the Polya Math Learning Center. I was asked to help out because I developed the corresponding course for a similar facility at Virginia Tech. When I visited UI, I was very impressed with the positive attitude of the faculty members, students and administrators whom I met. When I returned home to Blacksburg, I told Helen, my wife, that, while I never plan to leave Virginia Tech, if I were to consider relocating, Idaho was a place I would seriously consider. The opportunity to relocate came up when Jim Calvert retired as Chair and I was encouraged to apply for the position. Coming here has been a wonderful experience for me and my family.

What courses do you enjoy teaching?

I like teaching Abstract Algebra because I feel that it is a course that should provide its students with a true transformational experience. This is a time when students go from seeing mathematics as a way of solving specific problems and getting specific answers to a subject that is full of concepts, ideas and opportunities to explore the theory behind mathematics.

What achievements at the University are you most proud of?

I am certainly proud of the fact that the Polya Math Learning Center has been successful and has been sustainable. That has not been easy and it required a large team of professionals in our department to work hard together to make that happen. I am very proud to have joined with Kirk Trigsted to provide leadership to that team. Of course, we are continuing to improve Polya all of the time and participating in that process continues to give me joy. I am also proud of the fact that we have endured a very difficult financial experience here at the university that was precipitated by the 9/11 disaster and the slumping economy. I feel that by working with such incredible staff people, such as Jana Joyce, the damage to the department has been minimized. It is a credit to the faculty that our department has emerged as one that is well positioned to contribute to and to benefit from the university's strategic plan. I am very optimistic about our future and I am proud that I have contributed to the current state of affairs.

What are your goals for the next few years?

I would like to see the department grow in stature, to serve students even better, for the graduate program to expand and for us to make a real difference in the education of all math students in Idaho public schools.

What are your interests outside of Mathematics?

I like to golf, I am no longer any good at it, but I still really enjoy going out and golfing. I enjoy doing some woodworking at home (very primitive kind of woodworking), I have some interest in photography and I love listening to music (especially to my wife playing her cello!).

Actuarial News

Exams

The Society of Actuaries Exam P, Probability, is now computer based. It will be offered four times each year at various sites in the U.S. The closest sites are Spokane, Washington and Garden City, Idaho. The exam covers the material in Math 451 (Probability Theory). However, the questions are phrased in terms of risk and they are not textbook questions. Students need intense preparation. A seminar, Math 455, is offered this semester to prepare students for the exam.

Required Courses

The Society of Actuaries requires that you take certain courses in Economics, Finance, and Statistics. See Ralph Neuhaus in Brink 302 for a list of these courses. He can also give you details on how these courses can be substituted for some of your degree requirements.

Elna Grahn



ELNA HILLIARD GRAHN, Professor Emerita of Mathematics died August 3 in Moscow. She was 92. She earned a B.S. in Mathematics in 1935 and an M.S. in Mathematics and Education in 1941 all from the University of Wisconsin. She also was a graduate student at Stanford University in 1949 and 1950. She taught mathematics at a high school in Wisconsin, at a junior college in Iowa, and at a university in Indiana. During World War II she was one of the first female officers in the US Army, retiring as a major in 1946. She wrote a most interesting book *In the Company of WACS* about her distinguished military career. She came to the University of Idaho in 1947 and pioneered closed circuit television instruction from 1962 to 1969. Elna instituted the first math lab at UI to help students with their math homework. She was very proud of the fact that this initiative was the first step toward the institution of the Polya Math Learning Center. She retired from UI in 1969. However, Elna's love for helping students be successful did not end then. In 2002, she founded the Elna Grahn Polya Scholarship Fund which has been used over the last several years to recognize students who pursue innovative ways in which technology can be used to enhance math education. She also contributed to the community through her active involvement in many civic organizations. Her husband, Edgar, Professor Emeritus of Chemistry, and Dean Emeritus of the Graduate School, preceded her in death. She will be remembered for her uncompromising honesty, her tireless energy and her singular wit.

Elna Grahn Polya Scholar Award

This scholarship is given to a student who has demonstrated excellence in and commitment to the application of technology in the teaching of Mathematics. It is based on merit.

Melissa Curd was last year's recipient.



Jack Morris is Dean of the College of Business and Economics and a professor of Management.

1. Can Mathematics be used in certain M.B.A. programs?

Yes, M.B.A. programs typically are classified in two categories: Qualitative generalist degree or Quantitative specialist degree. Quantitative degrees would be more appropriate for somebody with math background. Examples of schools that value a strong math background and that build a mathematical modeling into their curriculum are schools like Wharton, University of Rochester, University of Chicago, Carnegie Mellon, all very good schools. Typically the Quantitative focus tends to either be in finance or in operations management. University of Oklahoma and Kansas State also have M.B.A. programs that have a very Quantitative focus.

2. For a student going into a quantitative M.B.A. program, what business courses would be useful?

What I would suggest, if they have the time, is to actually take a Business minor. Most M.B.A. programs are two year programs, and the first year of those M.B.A. programs is called the foundation year. In the foundation year you take intro to finance, intro to marketing and intro to operations. If you don't have the time to do a full blown minor as an undergraduate, then I would suggest that you consider the finance course.

The other area is operations management, and we offer follow-on courses. That has a fair amount of quantitative modeling that gets used throughout the courses.

3. In the actuarial science option, students do take Econ 201 and 202 Acct201 and 202 and Business 301 and maybe one or two other courses, so that would be close.

I was really talking more about upper division courses. Any student that is going on to an M.B.A. is going to have to take the basic micro and macro econ and financial and managerial accounting.

4. I was thinking that students in the actuarial science option might decide they want to do something like an M.B.A. instead.

Absolutely, students in the actuarial science option would be a perfect fit for quantitative type schools that I mentioned, if they enjoy the quantitative modeling. They may get more excited about opportunities on the trading floor or opportunities working for one of the big houses and trying to figure out a better model than the "Black-Sholes" model for modeling the pricing of options.

5. What Math and Stat courses would be worthwhile for a student to prepare for such an M.B.A. program?

In any of the quantitative schools, a fair amount of calculus gets used in modeling, so advanced calculus courses would be very helpful. Beyond that I would encourage any students interested in the quantitative field to consider any of the operations research courses. Another set of courses that are very good are engineering optimization. It isn't just about the calculus of optimization but also about search algorithms. I am not sure which courses in math might fit that description, if there are any, but those would be the extra ones.

Now in statistics, I would certainly consider even a stat minor. A lot of the modeling that we do really amounts to trying to model risk. We define risk statistically as you might guess. Having those optimization tools along with a very strong background in statistics goes a long way in trying to develop the models that are used in finance.

6. Could a math major with a quantitative M.B.A. get a job, and what kind of job?

Absolutely, when students consider a particular school, they really want to take a look at what the graduates of that school are doing in terms of jobs, and what the placement looks like at each of the schools. This should be one of the criteria in comparing M.B.A. schools. The jobs that are available after you graduate with an M.B.A. from one of these quantitative schools consist of opportunities on Wall Street and in Chicago, just to give you an idea.

7. Is there anything else that would be worthwhile for the student to consider?

Take the Graduate Management Aptitude Test even if you think you might be interested in an M.B.A. in five years. Take it while you are a student. Now, you are the best test taker you will ever be. The G.M.A.T. covers quantitative skills and reading and writing skills.

Interview with Eric Edwards



Eric Edwards is a student in the M.B.A. program at the University of Rochester. He graduated from UI in 2005 with a B.S. in Mathematics.

1. How is a math degree valued in business?

I wasn't as aware of how valued it was going to be when I was earning it, as I am now that I have it, but when people see a math degree they know exactly what you are capable of doing analytically. When you apply to a company, they see the math degree and there are no more questions, no more concern, whether you can do the analytical work. The business world has become more analytic based, using computers, statistical models, probability, calculus and finance. The fact that not very many people are good at that type of thing makes a person with a math degree a hot commodity.

2. How would you compare your work load in the M.B.A. program compared to your work load when you were a senior at the U of I?

The work in the M.B.A. program is more practical, not as theoretical. The workload is greater in the M.B.A. program than at UI, but you are not struggling as much with concepts as you are struggling to get through the material.

3. Which courses in your M.B.A. program are you doing the best in and which are giving you the most trouble?

Since I go to a very analytic school all of the courses have been pretty math based. My best has been business decision analysis class but I'm struggling with some of the financial terms in the finance course. A course in finance would have helped.

4. How do you fit in with the other students in the M.B.A. Program?

I fit in well, the other students are all fairly young and are all changing their degree or major trying to figure out what they are going to do.

New Graduates



SUSAN BATES-HARBUCK received her M.A.T. in Mathematics degree in December.

JASON COLE received his B.S. in Mathematics degree in December.

DONNA COYLE received her M.A.T. in Mathematics degree in December.

KATIE DAVES received her B.S. in Mathematics degree in December. She also received a B.S. in Education degree.

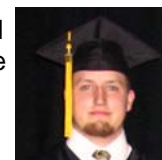
She is living in Meridian and is teaching at a middle school. MEGAN GUENTHNER received her B.S. in Mathematics degree in December.

BRYAN KLINGAMAN received his B.S. in Mathematics degree in December.

ZHONGXIAO LI received his M.S. in Mathematics degree in December. He is a Ph.D. candidate in Mathematics.



TIMOTHY NADREAU received his B.S. in Mathematics degree in December.



Recent Graduates



CRAIG CERISE received his M.A.T. in Mathematics degree in August.

JOSHUA RAKOW received his M.A.T. in Mathematics degree in August.

CONSTANCE STIP received her M.A.T. in Mathematics degree in August.

SHELLEY SWIFT received her M.A.T. in Mathematics degree in August.

Student Honors

Nathan Blake, Jonathan Gaffney, Shannon Grant and Christopher Tockey were given the University of Idaho Alumni Association "Award for Excellence" at a ceremony on December 8th. The awards are limited to 56 seniors, graduate students and third year law students. The students were honored for their hard work, and personal character along with their academic success. Nathan is double majoring in Mathematics and Computer Engineering. He is active in the Honors Council and College Democrats. Jonathon is double majoring in Mathematics and History. He is active in ASUI and was the student representative to the Faculty Council. In addition to majoring in Mathematics, Shannon is active in the Math Club and the Barker Trading Program with the College of Business. Christopher is double majoring in Mathematics and Mechanical Engineering. He is active in the Naval Officer Education Program.

Several scholarships are available to mathematics majors. The Taylor, Botsford, Wang and Hower scholarships are awarded to mathematics majors entering their junior or senior year. Total awards for these scholarships are \$500, \$1500, and \$2500. The Mathematics Department Scholarship has no class restrictions. All mathematics majors are automatically considered for a scholarship. Non-mathematics majors are eligible if they change their major to Mathematics or add mathematics as a second major. The selection is made by the faculty of the department in March.

Eugene and Osa Taylor Mathematics Scholarship

This scholarship was established in 1979 by the family and friends of the first head of the department, Eugene Taylor and his wife Osa. He directed the department from the time he came to the department in 1920 until he retired in 1950. In 1981, his family donated many of his personal mathematics books to the University of Idaho library. This scholarship is based on merit and is awarded to mathematics majors entering their junior or senior year. The recipients of the Taylor Scholarship this year were:

*Nathan Bialke
Jennifer Coffey
Jennifer Elle
Jonathan Gaffney
John Hamilton
Shannon Grant
Jesse Maclure*

*David Major
Julie Moore
Dustin Norton
Charles Von Tagen
Scott Voyles
Bryan Wilson
Niu Yang*

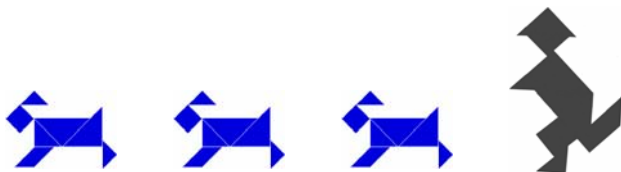


NSF Scholarships

UI has received a grant from the National Science Foundation to award scholarships to students majoring in Mathematics or Computer Science. Each Scholar will receive \$3000 per academic year, for up to three years. The Scholars are selected on the basis of high academic achievement and financial need. NSF seeks to increase the number of specialists in the mathematical and computational sciences. The program at UI is directed by James Foster in Biological Sciences, Paul Joyce in Mathematics, and Dan Davenport, the Director of Financial Aid. Math majors chosen this year are:

*Logan Evans
Julie Ann Moore
Katie Daves
Fabian Librado
Steven Dodd
Shannon Grant
Frederick Hole
Matthew Schug
Jesse Walson*

*Corinne Haase
Wade Copeland
Jonathan Gaffney
Eric Bryant
Shannon Glinski
Kyle Harbacheck
Jesse Maclure
Holly Steel*



Mathematics Department Scholarship

This scholarship is supported by annual contributions of friends of the department and is awarded primarily to freshman and sophomore mathematics majors. It is based on merit. The recipients this year were:

Timothy Karr, Jonathan Olson, Brian Faulkner, and David Prinz



J. Lawrence Botsford Scholarship

This scholarship was established by the family of J. Lawrence Botsford who was a member of the department from 1949 until his retirement in 1970. He also served as head of the department from 1950 to 1954. This scholarship is based on merit and is awarded to mathematics majors entering their junior or senior year.

Johnathan Gafney is this year's recipient.



Ya Yen Wang Memorial Scholarship

A long-time member of the Mathematics faculty, Ya Yen Wang died in January of 1995. Acting on her wishes, her family established the Ya Yen Wang Memorial Scholarship. This scholarship is intended for a junior or senior in Mathematics, preferably to be awarded to a woman. It is based on merit.

Shannon Grant is this year's recipient.



Linn Hower Honor Scholarship

This scholarship was established in 1991 by Mildred and Loyal L. Hower, parents of Linn Hower, who graduated from the University of Idaho in 1979 with a B.S. in Mathematics. This scholarship is awarded to junior and senior applied mathematics majors, preferably from rural Idaho, with a high potential for success in a mathematics or scientific field. It is based on merit.

Nathan Bialke is this year's recipient.

Past Graduates

ADAM WINN earned an M.S. in Management Information System from Boise State University this summer. He graduated from UI in 2002 with a B.S. in Mathematics.

BRANDY WIEGERS is now the Program Director of Explore Math at the University of California Davis. She graduated from UI in 2001 with a B.S. in Mathematics.

FAUNA SAMUEL is starting work on her Ph.D. in Chemical and Biological Engineering at the University of Colorado at Boulder. She graduated from UI with a B.S. in Math in 2005.

JOSH RUSHTON received his Ph.D. in Mathematics from the University of Wisconsin Madison in 2005. He earned his B.S. in Math from UI in 1998.

MICHELLE TSCHIDA has left the Boeing Company and is now working for Washington Mutual as a data analyst. She earned her B.S. in Math from UI and her M.S. in Statistics from UI in 1996.

KEN MEERDINK has worked for the Boeing Company in Seattle for 10 years. This spring he earned an M.S. in Software Engineering from Seattle University. This fall he began teaching Mathematics and Software Engineering at DigiPen Institute of Technology in Redmond Washington. DigiPen is the first school to offer college degrees in Animation and Game Programming.



Faculty and Staff News



In October:

Monte Boisen attended the State Board of Education Achievement Conference, the Idaho Science and Math Technology Consortium meeting, and the Governor's Symposium on Math and Education.



Matthew Rudd attended the Western Sectional Meeting of the American Mathematical Society in Salt Lake City.



Hong Wang attended the Twentieth Combinatorics, Cryptography and Computing Conference in Wichita, Kansas.



David Thomas ran a Math Workshop for the Math Science Partnership in Couer d'Alene.



Kirk Trigsted attended a Course Re-Design Conference in San Diego sponsored by the Pearson Education Inc.



Hirotschi Abo attended a Workshop on Syzygies and Hilbert Functions at Banff International Research Station. His talk was about "Construction of Vector Bundles".



In November:

Paul Joyce taught a course on the The Genetic Theory of Adaptation at the Center for Evolutionary Biology at Uppsala University in Sweden.



Brooks Roberts gave a presentation of the Ninth Annual Workshop on Number Theory in Hakuba, Japan.

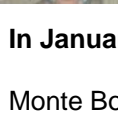


David Thomas met with officials of the Idaho Board of Education and with the Idaho School Board Association to discuss his Gateway to Mathematics Project.



In December:

Mark Nielsen was given an award for excellence by the UI Alumni Association in December.



In January:

Monte Boisen and Steve Krone attended the Joint Annual Meeting of the Mathematical Association of America and the American Mathematical Society in New Orleans.





Prize Problems

1. Let $a > 0$ and let f be a continuous function defined for $0 \leq x \leq a$. Let $g(x) = \int_x^a \frac{f(t)}{t} dt$ for $0 < x \leq a$. Show that $\int_0^a g(x) dx = \int_0^a f(x) dx$.

2. The last three digits of 7^{400} are 001, so that $7^{400} = 10^3 k + 1$, for some positive integer k . Find the last three digits in the decimal representation of 7^{9999} .

3. Find all real differentiable functions f such that, for all x , $f(x+2) = f(x)$ and $f'(x) = f(x+1) - 2$.

4. A teacher wrote the quadratic polynomial $x^2 + 10x + 20$ on the board. Then each student in the class changed the polynomial by either increasing by 1 or decreasing by 1 either the coefficient of x or the constant term. Finally the polynomial $x^2 + 20x + 10$ appeared. Did a quadratic polynomial with integer roots necessarily appear on the blackboard in the process?

Solve one of the four Prize Problems and you win a book!!! You can choose a book about mathematics, the history of mathematics, a collection of famous theorems, a collection of problems, specials topics, and so forth. Some problems may appear hard or impossible. But all have a brief solution if you approach them in the right way. Prizes will be awarded while supplies last. Show or send your written solution to Ralph Neuhaus.

Rules for participating:

1. You must be an undergraduate, an alumnus, or an alumna.
2. You must solve one of the problems, giving a full explanation.
3. One prize per person.

5. An $m \times n$ rectangular grid of squares is constructed and a diagonal line is drawn from one corner to the opposite corner. How many squares of the grid contain a segment of the line if m and n are relatively prime? If m and n are not relatively prime?