

Department of Mathematical Sciences

A Newsletter for Alumni, Faculty, Staff, and Friends

Spring 1997

Math Department Celebrates Math Awareness Week April 20th - 26th

by David Patterson

The Department of Mathematical Sciences will celebrate national Mathematics Awareness Week April 20th - 26th with a variety of activities. Math Awareness Week is an annual event promoted nationally by The Joint Policy Board for Mathematics, a consortium of mathematical organizations. The purpose is to communicate the beauty and usefulness of mathematics to the general public. The 1997 theme is Mathematics and the Internet (see page 3). For the last several years, the Math Department has organized a series of activities for the campus community and the public during Math Awareness Week and this year is no exception. Everyone is invited to attend any or all of these activities. For more information, please call the math department at 406/243-5311, e-mail michelj@selway.umt.edu or visit our World Wide Web site at <http://grizzly.umt.edu/math/>

Math Awareness Week Activities:

Monday-Friday, April 21-25, Mansfield Library Lobby: On display all week will be posters prepared by the members of Libby Krussel's Math History class on historical figures in mathematics.

Tuesday, April 22, 4:10-5:00 P.M., MATH 109: A colloquium talk by Prof. Wieslaw Zelazko, Institute of Mathematics, Polish Academy of Sciences, Warsaw, Poland, "A Short History of Polish Mathematics".

Wednesday, April 23, 3:30-5:00 P.M., Del Brown Room in Brantley Hall: Mathematics Awards Ceremony. Join us for refreshments and the formal presentation of a number of scholarships and awards for our undergraduate and graduate students. Scholarships include the Joseph Hashisaki Memorial Scholarship, the Mac Johnson Family Scholarships, and the Hartley E. Taylor Scholarship. Awards include the N.J. Lennes Awards for the top performers on a competitive examination, the John A. Peterson Mathematics Education Award, a book award given to a graduating senior majoring in mathematics education, the Graduate Student Distinguished Teaching Awards given to two outstanding Teaching Assistants, and the Undergraduate Teaching Scholar Award and Undergraduate Tutorial Scholar Award. In addition, we induct new members of Pi Mu Epsilon, a national mathematics honor society. We also recognize math students who have won University-wide awards.

Thursday, April 24, 4:10-5:15 P.M., Masquer Theatre, Performing Arts and Radio/TV Center: Dramatic reading of excerpts from *Arcadia*, a play with a mathematics theme by Tom Stoppard. See page 4, "Math Department Production of *Arcadia*."

Friday, April 25, 3:10 P.M., Mansfield Library 285: "Going Online with Mathematics Education", a presentation by Dr. Lynn Churchill, Director, University of Montana Information Technology Resource Center and Co-Director, Network Montana Project. This presentation will illustrate how video conferencing and the Internet are being used to help mathematics students and teachers work collaboratively and with distributed resources and expertise. The session will demonstrate ways of providing assistance to students or teachers who may be at a distance and show how the Internet provides a rich source of information for the mathematics and science classroom. The presentation will use a live inexpensive teleconference connection between mathematics educators at The University of Montana and Montana State University. Materials and tools from the Network Montana Project will illustrate how video conferencing and the World Wide Web are currently being used in classrooms and distance learning.

Friday, April 25, 5:00 P.M., Bonner Park: Annual Math Department Spring Potluck and Faculty-Student Softball Game. This is the highlight of the year: the annual thrashing of the students by the faculty in softball, followed by a potluck dinner. The weather has occasionally been a problem in recent years, but that hasn't affected the outcomes of the games nor the spirits of the competitors.



Notes from the Chair's Desk

The Department of Mathematical Sciences has from time to time sent newsletters to alumni and friends informing them about happenings in the Department. We enjoy hearing from you and want to keep open lines of communication with you. There will be a Spring and a Fall issue of this newsletter. We encourage you to send us your ideas on things you would like to know about the Department and on articles you would like to see included in this newsletter.

Spring is a beautiful time of year in Montana and spirits are high. As our lead article indicates, we are busy preparing activities for Math Awareness Week. The most exciting day of this week for me is our Awards Day. We continually look for ways to recognize the achievements of students who study mathematics. Most of these awards are possible through the generosity of our donors. As a show of our gratitude, my notes in this issue concentrate on how some of this year's larger donations are being used.

Faculty:

Gloria C. Hewitt, *Chair*
David Patterson, *Assoc. Chair*

Rick Billstein, *Mathematics Education*
Mary Jean Brod, *Mathematics Education*
William Derrick, *Applied Mathematics*
Rudy Gideon, *Statistics*
Jonathan Graham, *Statistics*
Gloria C. Hewitt, *Algebra*
James Hirstein, *Mathematics Education*
Leonid Kalachev, *Applied Mathematics*
Mark Kayll, *Operations Research*
Libby Krussel, *Mathematics Education*
Don Loftsgaarden, *Statistics*
Johnny Lott, *Mathematics Education*
Jennifer McNulty, *Operations Research*
George McRae, *Operations Research*
David Patterson, *Statistics*
Greg St. George, *Functional Analysis*
Karel Stroethoff, *Complex/Functional Analysis*
Thomas Tonev, *Complex/Functional Analysis*
Nikolaus Vonessen, *Algebra*
George Votruba, *Functional Analysis*
Keith Yale, *Complex/Functional Analysis*



◆ **The Mac Johnson Family Scholarships** are endowed by the family of Mac and Virginia Johnson, both of whom attended The University of Montana. Mac Johnson earned a bachelor's and master's degree here and taught mathematics at Cut Bank High School and Northern Montana College. Up to eight undergraduates will be recipients of these scholarships this year.

◆ **The Joseph Hashisaki Memorial Scholarships** are mainly funded by members of the Hashisaki family. Many other donors have also contributed to this fund. Professor Joseph Hashisaki was a member of the Department faculty from 1953-1962 and was the founder of the *Two Year College Mathematics Journal*. One or two upper-division undergraduates will be selected to receive this scholarship this year.

◆ **The Hartley E. Taylor Scholarship** is a one-time award given this year in memory of Hartley E. Taylor, who attended The University of Montana. It is made possible by contributions from the Extended Erickson Family. A junior or senior will be the recipient of this award.

◆ **The Undergraduate Mathematics Scholars Program** is a new program established in the Department. The goals of this program are to get and keep students actively involved in their studies, to make them a crucial part of the learning environment, and to increase their interest, excitement and confidence about

studying mathematics. One student will be selected as an Undergraduate Teaching Scholar for the Fall semester and another will be selected as an Undergraduate Tutorial Scholar for the year. Each will be assigned to a particular course and faculty member who will serve as their mentor. Fund raising for this program began last year with contributions from myself, and Lily and Jack Eidswick. With additional contributions this year from myself, the Dean, the President, Arnold Anderegg (in memory of George and Gertrude Shepard), and a large donation from Virginia Johnson, an endowment account for this new program has been set up. The program begins next year on a modest level with the selection of its first participants. As our endowment increases, we will be able to increase the number of participants selected for this program. In our Fall newsletter, I will include an article with more specifics about this program.

◆ Generous contributions this Spring were earmarked for the redecoration of the Faculty Lounge. The room has been painted and new furnishings consisting of two sofas, four chairs, a center rug, coffee table, dining table with four chairs, coffee counter, refrigerator and magazine rack add greatly to the quality of worklife in the department.

◆ A new sofa, donated by the late Barbara Reiman, marks the beginning of our efforts to redecorate the Undergraduate Study Room. A fund has been established in her honor to receive contributions for this project. This room is the most widely used room in the Mathematics Building and was a very special room for Barbara. A feature article about Barbara appears in this newsletter.

You are always welcome to visit with us and see how we're doing.

Gloria C. Hewitt

Mathematics and the Internet

by David Patterson

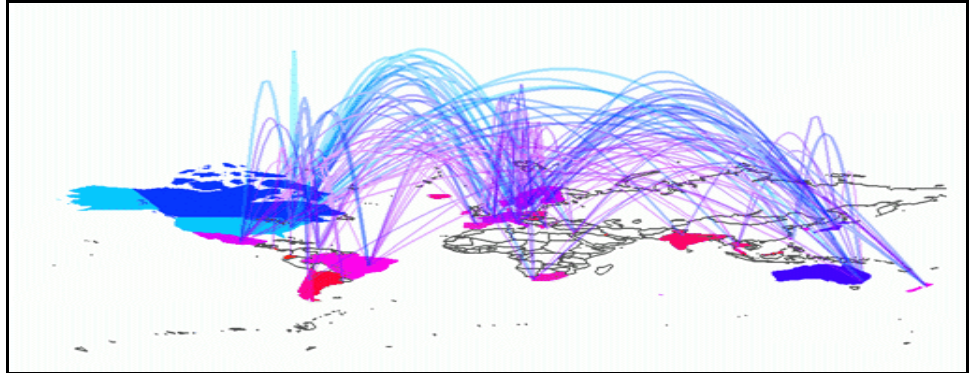
The theme of 1997 Mathematics Awareness Week is Mathematics and the Internet. Mathematics is the language of Internet operation, from the binary numbers that describe text and images to the complex data structures of search engines for the World Wide Web. Ideas from fields like number theory have enabled such key Internet technologies as data encryption for secure financial transactions and data compression for audio and video. At the same time, the Internet has given birth to world-wide collaborations among mathematics teachers and researchers, collaborations that are advancing both kindergarten through undergraduate education and our understanding of some of the most difficult problems in pure and applied mathematics.

In keeping with this theme, Dr. Lynn Churchill, a research Associate Professor in the Math Department and co-director of the Network Montana Project, will give a presentation and demonstration on Friday, April 25, on how the Internet is being used to enhance learning in classrooms in Montana. (See page 1 article on Math Awareness Week for more details.)

A variety of information on Math Awareness Week can be found on the World Wide Web at <http://forum.swarthmore.edu/maw/> including links to math-related sites. A few of these sites are described below. If you have access to the Web, you should also check out the Math Department's site at <http://grizzly.umt.edu/math/>. The University of Montana's home page can be found at <http://www.umt.edu/>. Both sites contain a variety of information about our department and the university.

Math-related sites you might find interesting:

- ◆ Cryptography Resources



Worldwide internet traffic over a two-hour period.

(<http://www.enter.net/~chronos/cryptolog.html>): Annotated collection of over 400 pointers to everything available on the Web regarding cryptography, including programs, source code, reports, and research.

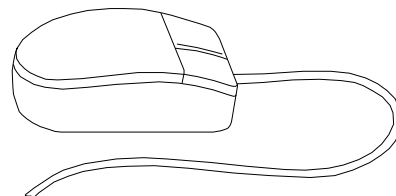
- ◆ The Connected Curriculum Project (CCP) (<http://ascc.carroll.edu/ccp/home.htm>): An NSF-sponsored project based at Carroll College, providing interactive, interdisciplinary, Web-based curricula to support the implementation of Mathematics Across the Curriculum. Maple labs, QuickTime movies, sound clips, text, and sample problems are combined in modules such as Units and Computer Algebra Systems, The Sound of Trigonometry, and Boyle's Law, that can be used by teachers and students to supplement existing courses and create new interdisciplinary courses.

- ◆ The Great Internet Mersenne Prime Search (<http://www.mersenne.org/prime.htm>): Pages dedicated to a rigorous search for new Mersenne

primes. The unique thing about the search is that it is not being carried out on supercomputers (as most searches have been) but by hundreds of individual volunteers on their PC's. The goal is to test every Mersenne number (Mersenne numbers are integers of the

form $2^n - 1$) with an exponent less than 1,300,000 by the end of 1997 and to test every exponent below 2,630,000 by the end of 2000. The search has already produced one new Mersenne prime (exponent 1398269) which is the largest known prime. It was found by a French man on a 90 Mhz Pentium PC. You can join this search by downloading the free software provided and checking out a range of Mersenne numbers to test. The software runs in the background on your PC using unused CPU cycles. You can also monitor the status of the search.

- ◆ The Math Forum Internet Resource Collection (<http://forum.swarthmore.edu/~steve/index.html>): A searchable, annotated database of math-related materials on the Internet.



Math Department Production of *Arcadia*

The Department of Mathematical Sciences, with support from Something-To-Do Productions (and special thanks to Johnny Lott), will present a staged reading from Tom Stoppard's recent play *Arcadia*. It will be held on Thursday, April 24th at 4:10pm in the Masquer Theatre, PAR/TV Building during Math Awareness Week. Snacks will be served at 3:30pm, prior to the performance. Admission is free. *Arcadia* is presented by special arrangement with Samuel French, Inc.

The action spotlights young Thomasina and her tutor Septimus — who specializes in Mathematics, but also reviews poetry, a hobby he picked up while attending Eton with his good friend, Lord Byron (1809). Intermingled are responses from Thomasina's descendents. They live in a different time (1993), with a different mind set: the liberal arts education is no longer in vogue. The interaction between the pure curiosity of the past and the 'publish or perish' approach of the present drives this enlightening farce from the leading playwright of our age — as action jumps back and forth between the ages. Archives are not quite as efficient as e-mail, eh?

Two of the finest actors in all of Montana have agreed to read for us. **Michael J. Verdon** from Helena, director of the H.S. Gilbert Brewery Follies of Virginia City, will lend his comic virtuosity to headline the cast for

Column By:
Robert Baker, Director
Something-To-Do Productions

scenes from 1809 (as Septimus the tutor). Missoula's own renowned "Best Actor of 1996" **Severt Philleo** will bring his eloquent flair to anchor the modern scenes (as Bernard, the ruthless researcher on Byron). With such talented support donated by Montana's leading performers, a delightful time is assured for all.

Here are some excerpts:

Thomasina: Septimus, what is carnal embrace?

Septimus: Carnal embrace is the practice of throwing one's arms around a side of beef.

T: Is that all?

S: No ... a shoulder of mutton, a haunch of venison well hugged, an embrace of grouse ... *caro, carnis*; feminine; flesh. We had *caro* in our Gaelic Wars. I thought you were finding a proof for Fermat's last theorem?

T: It is very difficult, Septimus. You will have to show me how.

S: If I knew how, there would be no need to ask you.. Fermat's last theorem has kept people busy for a hundred and fifty years, and I hoped it would keep you busy long enough for me to read Mr. Chater's poem in praise of love with only the distractions of its own absurdities.

T: Our Mr. Chater has written a poem?

S: He believes he has written a poem, yes. I can see that there might be more carnality in your algebra than in Mr. Chater's "Couch of Eros."

Chloe: The future is all programmed like a computer — that's a proper theory isn't it? Because everything including us is just a lot of atoms bouncing off each other like billiard balls.

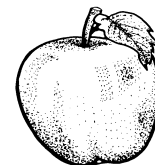
Valentine: Yes. There was someone, forget his name, 1820's, who pointed out that from Newton's laws you could predict everything to come — I mean, you'd need a computer as big as the universe but the formula would exist.

C: But it doesn't work, does it?

V: No. It turns out the maths is different.

C: No, it's all because of sex. ... The universe is deterministic all right, just like Newton said, I mean it's trying to be, but the only thing going wrong is people fancying people who aren't supposed to be in that part of the plan.

V: Ah. The attraction Newton left out. All the way back to the apple in the garden.



Mathematics Competitions for Montana Students

by James Hirstein

The Department of Mathematical Sciences continues its long tradition of participation with the mathematics competitions for high school and junior high school students. For the past three years, I have been state coordinator for two national exams sponsored by the American Mathematics Competitions. The American Junior High School Mathematics Examination

(AJHSME) is given in November. This year, 1725 students in grades 5 - 8 took the Junior High exam.

The American High School Mathematics Examination (AHSME) was

taken in February by over 2400 students from 50 Montana schools. Nationally, over 350,000 students take the AHSME. Individual and Team awards are presented at the state and national levels. The AHSME is the first step in the selection process of the U. S. Mathematics Olympiad Team. Last year, 20 Montana students took the American Invitational Mathematics Examination, and one student went

on to be one of 168 U.S. Olympiad qualifiers.

School pride and state scholarships are at stake.

The University of Montana is again hosting the Western Region of the State Mathematics

Contest, sponsored by the Montana Council of Teachers of Mathematics. Approximately 1000 students from schools throughout the region gather for a day of friendly competition and team spirit. Coordinating, scheduling, grading and reporting are shared by teachers from the competing schools and UM Math Education faculty. School pride and state scholarships are at stake.

Barbara J. Reiman: In Memoriam (1951 - 1997)

by Gloria C. Hewitt

In January 1994 Barbara Reiman enrolled at The University of Montana determined to get an advanced degree in mathematics. She had graduated from C.M. Russell High School in Great Falls, MT, received a bachelor's degree in anthropology from the University of Missouri-Columbia, and retired from the U.S. Navy after serving 20 years. She knew she needed first to take courses required for an undergraduate major in mathematics. She started out in Professor Manis' calculus class and he became her mentor and friend. She was an excellent student. The more mathematics she studied, the more excited she became about mathematics. In the Fall semester of 1995, she entered the graduate program as a master's student and teaching assistant. She became ill that Fall, but she continued, refusing to end her studies. Her illness forced her to drop all classes in the Fall of 1996. After a courageous 18 month battle with cancer, she died in February, 1997.

From the very beginning, she discovered the Undergraduate Study Room and spent most of her time on campus there. She often wished aloud that the furnishings, with special emphasis on the sofa, in this room were better and that someone would do something about the situation. She eventually came to the conclusion that the someone would have to be herself. Furnishing the room as she would have liked was beyond her financial capabilities, so she settled for providing a new sofa. When the new sofa

was delivered in February, she made her last trip away from home. She came across campus in a wheelchair and fellow mathematics students carried her to witness the unveiling of the new sofa. She said that her time spent in the Department were the happiest days of her life and it was extremely important to her to be able to give something back.

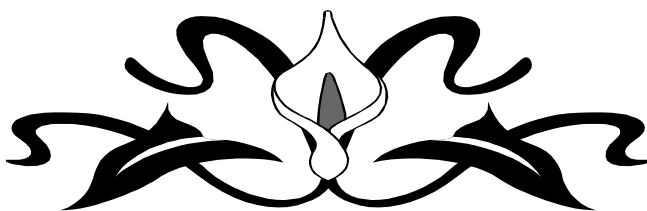
A Certificate of Recognition, in recognition of significant contributions to the learning and physical environment of the Department of Mathematical Sciences, hangs on the wall of the Undergraduate Study Room in honor of Barbara J. Reiman.

It reads:

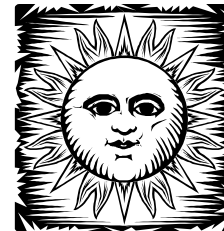
*For her commitment to the mathematics program at The University of Montana,
For her dedication and commitment in returning to school after receiving a bachelor's degree in anthropology and serving twenty years in the U.S. Navy to pursue graduate study in mathematics, beginning with freshman calculus,
For her excitement, enthusiasm and excellence as she pursued the study of mathematics,
For her setting an exemplary example for undergraduate and graduate students,
For her participation and interest in the national mathematical honorary society, Pi Mu Epsilon, and other activities in the Department,
For her donation of a beautiful sofa to the Undergraduate Study Room, whose existence meant so much to her,
The Barbara Reiman Fund with the primary purpose of refurbishing the Undergraduate Study Room is established.*

1996-1997 Honor Roll of Donors

Duane A. Adams
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William Ballard
Gavin Bjork
Charles Bryant
Cynthia Bryant
Darrel L. Choate
Robin G. Choate
Lynn Churchill
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Elena Toneva
Craig L. Tucker
R. Lynn Turnquist
Ernest Underwood
Lynn Webber



Mathematics Courses for the Summer



by James Hirstein

The Department of Mathematical Sciences is offering two graduate courses in the Summer of 1997. The courses are designed for teachers of mathematics in secondary schools. They may be applied toward the Master's of Arts for Teachers (MAT) degree or counted as teacher recertification credits. Both courses are offered during the UM Summer Session, June 30 - August 1, 1997.

MATH 520 Algebra for Teachers (3 semester credits)

10:50 am - 12:20 pm, Daily
Dr. Carol Ulsafer

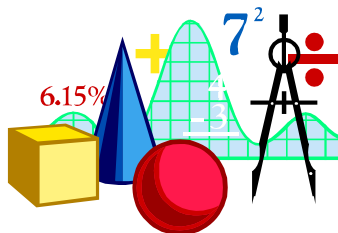
This course will investigate the strand of algebra in the secondary school mathematics curriculum through a survey of modern alge-

braic structures (groups, rings, fields, and vector spaces).

MATH 530 Geometries for Teachers (3 semester credits)

9:10 am - 10:40 am, Daily
Dr. Libby Krussel

This course will build on a basic foundation of Euclidean/Non-Euclidean Geometry. It aims to supply teachers with ideas and materials to enhance their geometry teaching by providing a historical perspective, a taste of results from transformational geometry, and an informal look at hyperbolic geometry.



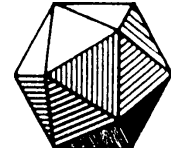
The MAT Program is intended to improve the proficiency and teaching techniques of secondary school mathematics teachers. Candidates can take courses in algebra, analysis, geometry, applied mathematics, operations research, statistics, and mathematics education. Teachers interested in the MAT Program can obtain more information and application from the Department of Mathematical Sciences, The University of Montana, Missoula, MT 59812.

1996 Graduate Degree Recipients

Name	Degree	Date	Thesis/Project Title
Melanie Anderson	M.A.	Spring 1996	<i>Analysis of a Mathematical Model for Mitotic Regulation in the Early Oocyte Cells of Xenopus laevis</i>
Shaohua Chen	Ph.D.	Spring 1996	<i>Positive and Oscillatory Radial Solutions Semilinear Elliptic and Parabolic Equations</i>
Jenifer Corp	M.A.	Spring 1996	<i>Balanced Graphs and Balanced Matroids</i>
Eric Dolven	M.A.	Fall 1996	<i>A Local Analysis of a Hopf Bifurcation in a Host Parasite Plant Interaction</i>
Garth Flint	M.A.T.	Fall 1996	<i>Teaching Parabolas for use with Satellite Dishes and Floodlights</i>
Mark Heaphy	M.A.	Spring 1996	<i>Transect Sampling and the Bootstrap Method</i>
William Heider	M.A.	Fall 1996	<i>Finitely Generated Modules Over a PID</i>
Wendy Houston	M.A.	Fall 1996	<i>Elementary Differentiability in Clifford Algebras</i>
Heidi Keck	Ph.D.	Spring 1996	<i>The Development of an Analytic Scoring Scale to Assess Mathematical Modeling Projects</i>
Jill Keil	M.A.T.	Fall 1996	<i>A Course Proposal in Mathematics for Health Occupations</i>
Ted Martellini	M.A.T.	Fall 1996	<i>A Multi-Tiered Approach to Optimization Problems</i>
Mary Beth Sinamon	M.A.	Spring 1996	<i>Application of the Principle of Quasi-Stationary Concentrations</i>



πμΕ/MAA Math Club Corner



[Our first article is in memory of Barbara Reiman]

Every Tuesday afternoon, in a small room of the Davidson Honors College, a group of undergraduates, graduates, and professors meet. They come from different places, they like different things, they hold different political views; in fact, the only thing they all have in common is a love for mathematics. An affliction most people consider absolute insanity, we consider fun; we call ourselves the Pi Mu Epsilon (πμΕ)/MAA Math Club.

For one hour a week we come together, eat cookies, and talk about Math. We started off the 1996-97 school year by "surfing the web" and looking at Math related web pages ranging from fractals to a page dedicated to the Golden Mean. The next week we spent an hour becoming

familiar with the ins and outs of Scientific Workplace, with some help from Mike O'Lear. With gum and tootsie rolls in our hands, Reno Lo Parco and Mary Jean Brod introduced us to some traditional American Indian games of chance. Keith Yale gave a book report on the autobiography "The Way I Remember It" by Walter Rudin. Past "history of math" students shared some of their papers with the club. John Gee spoke about his experiences with IBM, and Libby Krussel told us about her adventures in education in England, Scotland and the U.S. The only "secretive" activity in which we participated was the study of cryptography; Dick Lane shared with us ways in which mathematics is

prevalent in codes and ciphers. As the year winds down, we are planning activities including preparing new t-shirts for Math Awareness Week and new presentations by Watkins Scholars and faculty.

All in all it has been an exciting year for πμΕ and we are all looking forward to a great next year with new members and new adventures.

πμΕ/MAA Math Club Officers:

Kent Barbian	President
Megan Rehe	Vice President
Jenn Berg	Sec./Treasurer

Faculty Advisors:

Mary Jean Brod
Keith Yale



Mathematics Building, erected in 1903

Colloquium Calendar

Date	Speaker	Title
April 10	Prof. Benjamin Keller Computer Science Dept. Montana Tech	<i>Gröbner Bases: An Algebraist's Excaliber</i>
April 15	Prof. Alexander Khapalov Dept. of Pure & Applied Mathematics Washington State University	<i>To Be Announced</i>
April 22	Prof. Wieslaw Zelazko Institute of Mathematics Polish Academy of Sciences Warsaw, Poland	<i>A Short History of Polish Mathematics</i>
May 1	Prof. Yves Nievergelt Dept. of Mathematics Eastern Washington University	<i>To Be Announced</i>
May 8	Dr. Richard W. Stewart NASA Goddard Flight Center	<i>To Be Announced</i>
Sept. 4	Prof. Zinovy Reichstein Dept. of Mathematics Oregon State University	<i>To Be Announced</i>

If you are not on our mailing list and would like to be, or need to update your address, please contact:

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