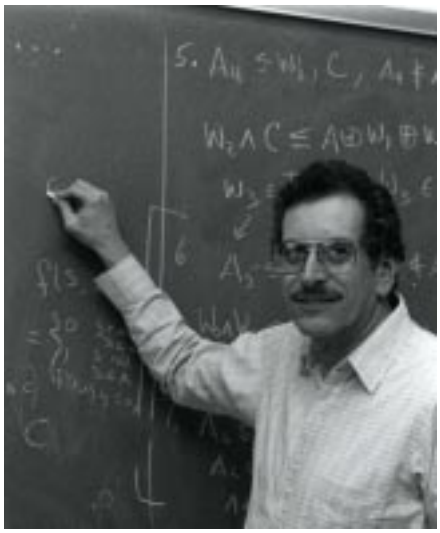
Math CONNections

A Newsletter from the UConn Mathematics Department
Volume 3, Spring 2000



FROM THE DEPARTMENT HEAD

by Chuck Vinsonhaler

The third issue of *Math CONNections* brings another welcome opportunity to review highlights of an exciting year. Congratulations to editors Hurley, Leibowitz, Lerman and Sidney on a lively and informative newsletter.

Our research and teaching program has benefited from the arrival of Postdoctoral Fellows David Levin, Sudeb Mitra and Kevin Wald. They have enlivened both the teaching and research atmosphere with fresh ideas and energy. We have added 4 postdocs for the coming year, and plan to bring the total up to 10 in Fall 2001.

Faculty members continued to receive national and international recognition for their research. Rich Bass, Evarist Giné Xue-Mei Li and Miki Neumann received 3-year grants from NSF. That body also awarded a grant to Giné to support the Fifth World Congress of the Bernoulli Society in Mexico City, of which Evarist is a co-organizer. Tixiang Wang and a colleague in Engineering received a grant from the Connecticut Department of Transportation. New Assistant Professor Ed Taylor, who brought an NSF Postdoctoral Fellowship with him to UConn, received funding for summer research at

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LERMAN RECEIVES AAUP RESEARCH EXCELLENCE AWARD

One of our editors, Manuel Lerman, received the 1999 Research Excellence Award from the UConn Chapter of the American Association of University Professors. This university-wide award recognizes outstanding research contributions by UConn faculty members.

Manny received his PhD degree from Cornell University in 1968. After appointments at MIT and Yale, he joined our department as an associate professor in 1973. He was promoted to Professor in 1976.

The award cites Manny's outstanding work in mathematical logic. His specialty is computability theory (also known as recursion theory), an area in which one tries to understand the information content of sets that computers use as *oracles*. Those are potentially infinite collections of information that can be supplied to a program. Two sets are compared through

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HURLEY A CHANCELLOR'S IT AWARDEE

As the second edition of *Math CONNections* went to press, co-editor Jim Hurley was one of six faculty and staff to receive the 1999 Chancellor's Information Technology Award. Begun a year earlier by former Chancellor Mark Emmert, the award's purpose is to "afford recognition commensurate with" what Emmert characterized as the University's "leadership position in many of the specialized areas of application of information technology in higher education."

As the first awardee from Mathematics, Jim was cited by Vice Chancellor for Information Technology Paul Kobulnicky for twenty years of active involvement in the integration of technology with the teaching of undergraduate and graduate mathematics. Some readers may have experienced his initial steps in this direction with first-generation programmable calculators (TI-57 and TI-58 models), which had no graphics capability but did compute Riemann sums for more than 10 subintervals! Other readers may have taken the Computer Modeling in Science course, which Jim and colleagues in Chemistry, Physics and Statistics created at that same time.

In the mid-80s Jeff Tollefson and Jim were among the first university faculty anywhere to offer personal computer laboratories as a regular part of introductory calculus. Jim's work in this area attracted enough attention to garner invitations to participate in the seminal Calculus for a New Century conference in 1987 and International Congresses on Mathematics Education in Budapest the following year and Québec four years later.

From 1989 to 1997, Jim was principal investigator on five different grants (three from the National Science Foundation) that supported expanded use of computing in our curriculum. He gave many invited talks about this work at universities, mathematics meetings and NSF conferences. His recent article in the American Mathematical MONTHLY, which reports on the positive results of this activity, has drawn favorable comments as one of the first to discuss in depth the impact of the technology-heavy calculus-reform movement.

The series of projects at UConn, in which Chuck Vinsonhaler, Roger Hansell, Bill Wickless and Alan Stein were major collaborators, produced support materials still in use in calculus, differential equations and linear algebra. Kobulnicky's citation also mentioned Jim's most recent Mathematica

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FROM THE EDITORS

This year's edition has profited handsomely from the addition of Jerry Leibowitz and Stu Sidney to the editorial staff. Their writing, editing and good cheer deserve major credit for this document making it to your mailbox!

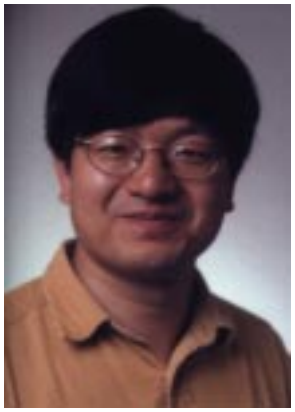
As you can see, we are continuing the kinds of feature articles that prompted positive feedback from readers of the first two issues. Professor Evelyn Ahlberg has graciously authored a history of the Hartford Campus Math Department, and we greatly appreciate the contribution from Dr. Harvey Einbinder (B. S., 1945) of his impressions of the UConn he experienced more than half a century ago. We would like to feature similar articles by graduates from other eras, and encourage you to contact us if you are interested in writing one or have suggestions for other articles.

This year marked the twentieth anniversary of our undergraduate actuarial program and the fifteenth anniversary of the graduate actuarial program. We salute this successful program with profiles of its first graduates, and also introduce you to one of our current outstanding crop of undergraduate students.

Next year, we hope to reinstitute the "Notes from the Alumni/ae" column, but to do so we need to hear from you about your post-UConn life! We are saving this year's notes to add to those we hope this exhortation will inspire. Speaking of inspiration, don't miss the convenient form for making other contributions that our work may spur: as usual, we find ourselves with more great ideas than funds to implement them. See "Development Notes" for a list of the worthy projects your financial contributions can help to advance.

Jim Hurley, Jerry Leibowitz, Manny Lerman and Stu Sidney ■

Hurley, continued from page 2:
notebooks and Maple worksheets, which he demonstrated briefly at the award ceremony and which he continues to develop not only for calculus and differential equations but also for the graduate abstract algebra sequence. As Jim says, "Tomorrow's scientists, engineers and—just as surely—mathematics faculty will use computing across the entire span of their work. Early exposure to such a fundamental tool early in their own coursework can thus give them a head start on a successful career." ■



GUI HONORED BY CANADA

Recently, one of our three new faculty colleagues, Changfeng Gui, was awarded the prestigious André-Aisenstadt Prize by the Centre de Recherches Mathématiques of Canada. The Prize, created in 1991, "is intended to recognize and reward talented young Canadian mathematicians. The Prize, which is given for research achievement in pure and applied mathematics, includes a $3000 [Canadian] award. At the time of nomination, candidates must be Canadian citizens or permanent residents, and no more than seven years from their PhD."

Changfeng joined us after six years in Canada. After earning bachelor's and master's degrees from Peking University, in 1991 he earned his doctorate at the University of Minnesota under the direction of Wei-Ming Ni. He chose Minnesota as his post-Beijing destination partly for programmatic reasons, partly because some friends a year or two ahead of him were there. After receiving his degree, Changfeng spent two years at the Courant Institute (New York), two years at McMaster University (Ontario, Canada) and four years at the University of British Columbia, where he received tenure.

Changfeng specializes in non-linear partial differential equations: existence, asymptotics, symmetry, and stability properties of solutions to PDEs. His work falls into two categories. First, he did joint work with Martin Barlow and Nassif Ghoussoub, both of UBC, and our own Rich Bass, then of the University of Washington, on the DeGiorgi conjecture, which concerns the symmetry of solutions in Euclidean space to an important PDE. The problem arises from studying phase transitions. Parenthetically, Changfeng did not actually meet Rich until he came to UConn as a job candidate last year.

Changfeng's more recent work has focused on mathematical models of biological pattern information. One considers an equation that describes a biological phenomenon involving two species: an *activator* and an *inhibitor*. Each might be a chemical or a virus or some other microorganism. The first might activate growth of new body parts of some organism, while the second might inhibit it. The object is to study the concentration function that models the density of the activator or inhibitor. The model is the standard *Gierer-Meinhardt model.* Changfeng's involvement with this problem began in 1993, though his advisor Ni had already been working on it for some years. Changfeng's first paper on the subject, written in 1995 and published in 1996, was a solo effort; his second was co-authored with Junchang Wei of Hong Kong. His work was a breakthrough from the study of single-concentration problems to that of multiple-concentration problems. ■

Lerman, continued from page 1:
an analysis of whether the information supplied by the first is sufficient to compute the second, and their degree of complexity is determined by studying an algebraic structure. Manny's work has been important in understanding the properties of these structures, and has appeared in leading mathematics journals. The significance of his contributions has been recognized through many speaking invitations at universities and major professional society meetings. The National Science Foundation has supported Manny's research with nearly continuous grants since 1969.

Manny's book *Degrees of Unsolvability* appeared in 1983, and at present he is for the second time the coordinating editor of a conference proceedings volume. He has been active in the Association for Symbolic Logic, serving as a member of its governing council for many years and for the past 13 years as coordinating editor of its book series, *Perspectives in Mathematical Logic* (published by Springer-Verlag). He has also chaired several ASL committees, currently the Committee on Prizes and Awards.

In addition to being one of the editors of *Math CONNections*, Manny chaired the Department's Graduate Program Committee for many years, and has served on numerous other departmental committees. He also enjoys teaching—especially Math 223, Euclidean and Non-Euclidean Geometry. Besides teaching the mathematics, he relates its content to the historical search for knowledge and highlights its role as an example of a purely intellectual pursuit that has spawned very important applications. His goal is to instill in his students a feeling for how and why mathematics is studied while they learn the mathematics itself. ■

Standing left to right: Sudeb Mitra, David Levin, and Kevin Wald

MATHEMATICS POSTDOCTORAL PROGRAM

The Department has begun an exciting new post-doctoral fellowship program that will enhance both its teaching and research efforts. The eventual goal of this initiative is to have a rotating roster of 10 post-doctoral fellows, all hired at competitive salaries, with three or four new post-docs arriving each year for three-year appointments.

The first three post-docs joined us in Fall 1999. They are David Levin (PhD 1999, University of California at Berkeley), Sudeb Mitra (PhD 1999, Cornell University), and Kevin Wald (PhD 1999, University of Chicago). David is a probabilist who is especially interested in Markov chains, random walks, and percolation and interacting particle systems; Sudeb is a complex analyst specializing in quasiconformal mappings, Riemann surfaces and Teichmüller spaces; and Kevin's research is in mathematical logic and computability theory. All have contributed actively to department and regional seminars in these areas.

The impact of the program on undergraduate teaching should be dramatic. In a few years, every student in the regular and honors first-year calculus courses will be in a small class taught by a professor or post-doctoral fellow!

The fellowship holders will bring significant benefits to our research activity as well. As the presence of the first three post-docs amply demonstrated in 1999–2000, the flow of fresh ideas and ambitious young mathematicians through the department is a source of stimulation for both the permanent faculty and our graduate students. We look forward to the expansion of this program over the next two years. ■

UNDERGRADUATE PROFILE, PAUL NAVRATIL

Paul Navratil is a junior actuarial mathematics major who has benefited from the programs available to outstanding students at UConn. "I have always found my Honors courses in all academic departments to be particularly engaging, and the Mathematics Scholars Program has provided me with upper-division mathematics courses that further stretch my abilities." Paul has passed the Part 1 and 2 exams administered jointly by the Society of Actuaries and the Casualty Actuary Society and plans to take courses to prepare him for Parts 3 and 4 upon graduation. He has been involved in tutoring calculus courses for the department since his second semester, and last fall was among the first participants in the Undergraduate Teaching Assistant program. In addition to being able to help students develop an interest in mathematics, he has found these positions to be of great help in deepening his own understanding of calculus. Paul plans to pursue a Master's degree in Actuarial Mathematics and hopes to have the opportunity to teach a course before leaving the University.

Despite his rigorous academic schedule Paul makes time for his other passions. He is a violinist with the University Symphony Orchestra and, as a Willington resident, a long-time member of the Willimantic Community Orchestra. During weekends he has worked as a counselor at Camp Horizons, a local residential camp program for people with mental disabilities. During the past two summers Paul has worked at a Boy Scout High Adventure Base in northern Maine. An Eagle Scout himself, he has acted as mentor and guide to younger scouts, leading them on extended wilderness canoe trips and teaching them about the history and environment of the area. He took advantage of the opportunity to study abroad in Grenoble, France this past spring, and plans to pursue an actuarial internship this summer to find out more about his career opportunities. ■

Standing left to right: Ed Taylor and Dick London

THREE ADDITIONS TO FACULTY

by Stu Sidney

In Fall 1999 we welcomed two and a half new faculty members to the UConn Math Department: Changfeng Gui, Richard London, and Edward Taylor. (Why "a half?" Read on …) For background on Changfeng, see the article on page 3 about his recent and prestigious prize.

Dick London is the "half," because although his faculty appointment is new, in fact we have enjoyed the pleasure of his company for some time. As a visitor in the 1983–1984 academic year, he was UConn's first "pure" actuarial science professor. He also visited during the 1988–1989 and 1998–99 academic years.

Dick earned his bachelor's degree in mathematics at Lebanon Valley College and his master's degree in actuarial science from Northeastern University. He became a Fellow of the Society of Actuaries in 1972. After teaching at Northeastern from Spring 1968 through 1979, he spent two and a half years visiting the University of Waterloo, followed by two years at the University of Hartford (overlapping his first visit here). After Dick and his colleague Geoffrey Crofts decided that there was a big need for improved educational materials in actuarial science, he spent the bulk of 1984–1998 developing sixteen textbooks and numerous study manuals at their company, ACTEX. Several of these study guides and books, such as *Survival Models and Their Estimation*, now in its third edition, have been widely adopted. Although he has retired as a publisher, Dick is still helping ACTEX fulfill its educational mission.

Dick is on the Board of Governors of the Society of Actuaries. As you would expect, his major involvement is in educational matters: he is a member of the Society's Educational Policy Committee. Thus he is especially well positioned to keep our actuarial science curriculum up-to-date and to provide our students with insightful advice about current actuarial trends.

Ed Taylor comes to us from the University of Michigan, where he spent five years on post-doctoral fellowships—including a still active one from the National Science Foundation—after receiving his doctorate in 1994 from SUNY at Stony Brook. His thesis was written under the direction of Bernie Maskit, who is also the mathematical parent of Andy Haas. Ed's undergraduate degree is from Brown, and he holds a master's degree from the University of Texas.

His work lies at the intersection of geometry, topology and analysis. His early research deals with the following kind of question. If you hit a three-dimensional shape made out of metal, what happens to the sound as you change the shape, and what does the sound tell you about the shape? (In the minds of some readers may now echo memories of Mark Kac's classic article, "Can one hear the shape of a drum?")

Ed's more recent efforts address the random behavior of geodesics on hyperbolic manifolds. Closed two-dimensional hyperbolic surfaces sit naturally in three-dimensional hyperbolic manifolds, so one can talk sensibly about generic two-dimensional hyperbolic surfaces. Ergodic properties of geodesics on the 2-D surfaces provide information about the geometry of the ambient 3-D manifold.

In addition, Ed and his wife Petra Bonfert-Taylor (of Wesleyan) are working together to generalize the Patterson-Sullivan theory—which deals with geometric, conformal and ergodic properties of Kleinian groups acting on hyperbolic n-space—to quasiconformal groups. ■

RETIREMENTS

Ed Tomastik received his PhD in mathematics from Case Western Reserve University in 1965 and came to the University of Connecticut that same year. Specializing in differential equations, he has won research grants from the U.S. Army and a technology grant from the NSF, and has also done consulting work for the U.S. Navy. He has served as director of graduate admissions and chair of the undergraduate curriculum committee and was instrumental in getting the applied math major instituted. He has written text books that are currently used at the University of Connecticut and other places in the country. ■

ACTUARIAL SCIENCE UPDATE

by Richard L. (Dick) London, FSA
Director of Actuarial Science

This article describes several important events that have occurred over the past year involving the Department's Program in Actuarial Science. As such, it updates the assessment of the program that appeared in the last (Summer 1999) volume of this publication.

Staffing:

Following the retirement of Walt Lowrie, FSA, in the Summer of 1998, I was asked to temporarily take over his role of program director as well as to teach several courses as a visitor in the 1998–99 academic year. On January 1, 1999, I resigned from ACTEX Publications, and agreed to a full-time teaching and administrative position with UConn. We continue to enjoy having Walt, as well as Jay Vadiveloo, FSA, as adjunct professors.

Curriculum Changes:

The revisions in our actuarial curriculum, referred to in the preceding volume of this publication, have now been completed. The most important elements of this revision are: (1) establishing a second-level undergraduate course in applied probability (Math 232), focusing primarily on stochastic processes; (2) establishing a second-level undergraduate course in financial mathematics (Math 289), an extension of traditional interest theory to include quantitative analysis of financial and investment risk; (3) an expansion of our traditional preparation course for the first actuarial exam (Math 283) to include a gentle introduction to actuarial mathematics itself; and (4) an expansion of our course in operations research (Math 286) to include more material on stochastic simulation.

The net effect of these curriculum changes will be to introduce our students to the higher level of mathematical sophistication, much of it computer-based, making its way into actuarial science. This, in turn, should improve our students' abilities to attain their professional actuarial credentials, which enhances their employment opportunities. From the viewpoint of employers, the curriculum improvements make our graduates more attractive and valuable employees.

Industry Partnership:

We continue to refine our relationship with our existing industry partners, in the areas of employment (both permanent positions and summer internships), speaker visits, joint research projects, and financial support for our scholarship program. (Scholarship support totals $40,500 for academic year 1999–2000, an all-time high.) At the same time, we are working to expand the number of employers actively participating in our industry partnership program.

The Aetna graduate internship program remains strong. Discussion with other companies is now under way regarding other forms of work-study arrangements.

Actuarial Graduates Reunion:

To celebrate the twentieth anniversary of the undergraduate actuarial program, and the fifteenth anniversary of the graduate program, an actuarial graduates reunion was held on September 18, 1999, in the new South Campus Ballroom. Over 100 graduates and guests attended the reception and dinner. The program included remarks by CLAS Dean Ross MacKinnon, Department Head Chuck Vinsonhaler, ASA, retiring Director Walt Lowrie, FSA, and Class of '79 Graduate Cliff Lange, FSA.

Also invited to the event were the 1999–2000 group of Actuarial Scholars and representatives of our industry partners who support the scholarship program.

To top it off, the event was held at no cost to the attendees or the University, due to a generous grant from the ACTEX Foundation.

We Invite Your Help:

Professional academic programs such as Actuarial Science depend in many ways on guidance and support from their associated professions. To our actuarial graduates and other friends, we ask for your comments and suggestions regarding our program. What have you discovered in your actuarial career experience that you could share with us to help improve our program, and better serve our students and our profession in the future? You can write, phone, fax, or e-mail me (`london@math.uconn.edu`) at any time. We would love to hear from you.

■

THE FIRST ACTUARIAL CLASS

by Jerry Leibowitz

In 1999, we celebrated the twentieth anniversary of the first graduation of mathematics/actuarial science students at UConn. We profile three of the members of the class who have had distinguished careers—Lorraine Powers, Russell Steingiser, and Clifford Lange.

Shortly after graduation, Lorraine moved to Vermont. While her husband pursued a graduate degree, she worked for a pension plan administrator, Future Planning Associates. Upon their return to Connecticut, she put this experience to good use, first as actuarial assistant in a pension department of the consulting firm Frank B. Hall, then as a senior pension actuarial assistant at CIGNA. After moving up to enrolled actuary in a few years, she became a consulting actuary. She enjoys the variety of challenges and marvels at how much has changed in the profession in these 20 years. Lorraine tells us, "If I had to describe what being a pension valuation analyst, or enrolled actuary, was like, it would be 'part time computer programmer, part time lawyer, part time accountant, full time actuary.' I have never been bored—there is always something new to learn."

Russell, who lives in Glastonbury with his wife and three children, earned many honors at UConn, including election to Phi Beta Kappa, Phi Kappa Phi, and Pi Mu Epsilon (the national mathematics honor society). In this respect he was continuing the family tradition, since in 1949 his father received the first PhD granted by the University. He is a Fellow of the Casualty Actuarial Society, and his entire professional career has been spent at the Travelers, where he has served in many departments and is now an associate actuary, specializing in managed care for Workman's Compensation. Russell enjoys vigorous activities, including snowboarding (which your editor assumes gives him ample opportunity to simulate situations of casualty and catastrophe), has been active as a coach of children's sports, and has spent more than eleven years in the YMCA Indian Guides/Indian Princesses program with his family.

Actuarial PhD graduates Yow-Ming Kang and Chin-Mei Chueh

Clifford Lange

I remember Cliff Lange excelling in a theorem-proving course I gave in the late 70's. His first position was with Connecticut General, where an excellent in-house educational program assisted him in attaining Fellowship in the Society of Actuaries by 1983. He was a consulting actuary at Price Waterhouse from 1984 to 1989, then corporate actuary and later chief actuary at Connecticut Mutual until 1994. Following two years at Tillinghast/Towers Perrin, he left Connecticut to serve as chief actuary at Golden Rule Insurance Company. In 1998, he moved to his current position as chief actuary for GE Financial Assurance, in Richmond, VA. The responsibilities are great and the job involves international travel (England, Japan, and India). Cliff, his wife Cindy, and their three daughters live in Richmond.

Cliff, who was the keynote speaker at the 20th anniversary reunion banquet last September, has provided us with 'a brief list of lessons learned,' and we will share as much as space permits.

1. **Keep absolute integrity.** A clear conscience is a priceless asset.
2. **Develop interpersonal skills.**
3. **Be resilient.**
4. **Be positive.**
5. **Take prudent risks.**
6. **Have fun.** Life is too short to be miserable. If you are not having fun, switch jobs, reflect on your perspective. Develop a new hobby, nurture a friendship.
7. **Continue learning.**
8. **Increase your personal marketability.**
9. **Thrive on change, don't fear it.**
10. **Keep business in perspective.**

■

THE EARLY YEARS AT UCONN

by Harvey Einbinder, 1945

In the summer of 1943, just after my 17th birthday, I entered UConn and studied continuously in an accelerated wartime program. The enrollment was much smaller then; there were fewer than 1,800 students on a campus that consisted of a small number of buildings separated by wide-open spaces and lots of green grass. Koons Hall was a dormitory then, and I shared a suite with two other students.

Professor Albert Waugh, who later became Dean of Arts and Sciences, had post office box 1 while I rented box 135 during the two years I was at UConn. When I took two semesters of statistics with him, we used his textbook on the subject. We had to laboriously calculate statistical parameters—standard deviations, correlation coefficients, chi-square, etc.—by hand. This tedious labor seriously diminished the attractiveness of the subject by emphasizing numerical accuracy rather than theoretical understanding.

One outstanding course was a two-semester sequence on World Literature taught by Professor Warnock who had co-edited the anthology of readings we used. When he reached the French poets Rimbaud and Verlaine in the second semester, he announced, "I will now draw a curtain over their personal lives." We students didn't know why. In 1944 he obviously could not discuss homosexual love.

My original intent was to major in physics. The department consisted of two professors, Ferguson and Kinsey, both of whom had master's degrees from the University of Michigan. When I took Electricity and Magnetism, there was only one other student in the class. The textbook we used was very elementary; no calculus or Maxwell's equations.

The offerings were so limited, I switched my major to mathematics. Some of the courses there were also limited. When my friend Len Rinaldi, who wanted to be an actuary, studied algebra, he used a textbook written by Hall and Knight first published in the 1850s. When we took a course together in complex variables taught by Professor Sedgewick, the text was a small thin book by Phillips. Several years later I studied the subject independently using the substantial texts by Titchmarsh and Copson and learned how much we did not cover.

In the course on the Theory of Equations taught by Prof. Montgomery, we learned about symmetric functions and how to solve cubic and quartic equations, but nothing about Galois Theory.

There were no separate scientific libraries. All the mathematics books were housed in the newly constructed Wilbur Cross Library. English composition classes were held in the basement. Consequently, we did not know that *Mathematical Reviews* or mathematics journals existed.

During the two six-week summer sessions of 1945, I was able to earn nine credits by completing three math courses—Advanced Calculus, Vector Analysis, and Partial Differential Equations—via independent study with Professor Sedgewick. We would meet each week, and he would go over what I had done. At the same time, I earned eight additional credits by completing two semesters of Physical Chemistry. These 17 credits enabled me to graduate in September 1945 and enter Columbia as a graduate student in Physics after spending two years and three months at UConn.

A few months later I learned that I had failed to take a required course in the humanities section of the curriculum that included philosophy. Fortunately Dean Waugh decided to waive the requirement, stating that studying mathematics was a form of logical thinking that could substitute for philosophy.

In the Spring of 1946, I returned to Storrs to take an oral examination for a degree with honors. During the exam, almost all questions were on physics rather than mathematics. The only question I was unable to answer was asked by Prof. Montgomery, and dealt with Euler's work on the theory of equations. Nevertheless, I was awarded a degree with highest distinction in Mathematics.

The end of the war produced great changes at UConn as the school rapidly expanded to accommodate thousands of discharged soldiers entering under the GI bill. When I visited Storrs a few years after graduating, I could hardly recognize the campus, and the changes have gone on ever since.

About the author: Harvey Einbinder received a PhD in physics from Columbia. After serving as a summer employee, he became a consultant to the Cornell Aeronautical Laboratory and investigated the hydrodynamic stability of flame fronts. While a graduate student, he noticed that applying thermo-dynamic principles to an ideal gas leads to a first-order partial differential equation whose solution, when combined with Heisenberg's uncertainty principle, fixes the behavior of Fermi-Dirac and Bose-Einstein gases at absolute zero. He called this result the aleph theorem, and it was adopted by the eminent German physicist Arnold Sommerfeld as an exercise in his textbook on thermodynamics and statistical mechanics. Dr. Einbinder served as a consultant to General Electric on the Atlas missile project and

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DEVELOPMENT NOTES

We hope that ***Math CONNections*** conveys some of the sense of excitement we feel about the Department's new programs, and some of the pride we take in the high quality of our faculty and students. The achievements you read about stimulate us to continue to explore new directions and develop new programs in pursuit of excellence.

Such efforts, of course, require financial resources. To supplement the basic funding we receive from the University and external grants, we depend on contributions from our alumni and friends. We are grateful for any and all support that you may be able to provide. For further information about making a gift to the Department, please contact Chuck Vinsonhaler (860-486-1290, `vinson@math.uconn.edu`). A list of the Department's named funds that support students and special activities follows.

The Louis J. DeLuca Memorial Fund supports the Outstanding Teaching Assistant Award each year. Lou was legendary for his devotion to and excellence in teaching, and he also served as Associate Dean of the College of Liberal Arts and Sciences. His death in 1986 saddened us greatly and left a large void.

The Constance Strange Memorial Fund sponsors the Graduate Student Community Service Award each year. Connie Strange was the long-time Department secretary in charge of the graduate program, and in addition provided a great deal of personal support and encouragement to our students. Her valiant struggle against breast cancer ended in 1996.

The General Mathematics Fund is used to sponsor miscellaneous items of importance to the department such as this newsletter and awards to outstanding students.

The Mathematics Actuarial Science Fund and the Center for Actuarial Studies Fund support activities associated with the Actuarial Science Program. Two other funds support scholarships for actuarial majors: The CIGNA Actuarial Science Fund and the Gordon Aston Actuarial Science Fund.

The Mathematics Graduate Scholarship Fund is used to provide scholarships for outstanding mathematics graduate students.

Yes, I would like to help the Mathematics Department with my enclosed gift.

Name:_____Class Year:_____

Address:_____Phone:(___)_____

City:_____State_____Zip:_____

Amount enclosed:_____Fund:_____

Please make checks payable to the UCONN Foundation/fund-name and mail to Department of Mathematics, University of Connecticut, 196 Auditorium Road U-9, Storrs, CT 06269-3009. Your gift is tax-deductible as provided by law. Thank you for your gift to the Department of Mathematics.

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PLEASE LET US HEAR FROM YOU!

Your editors hope you found this issue informative and interesting. Among the raft of items that come to one's mailboxes (both real and virtual), some are actually welcome. We would like our newsletter to earn a place in that category, but can succeed in that goal only with feedback from our readers. Please let us know what you liked, what you wish we had included, and what we can consider reducing or removing.

One feature we are hoping to reinstate is news about former colleagues and students, for which we will rely on your input. Please use the form below to tell us about your accomplishments, report any errors in the address label, and tell us your reaction to this publication. You can mail it to the Department, or if more convenient FAX it to (860) 486-4238 to the attention of the Newsletter. Many thanks for your help!

Name:_____ Years at UConn:_____

Status: Undergrad _____ Graduate student _____ Degree(s) and year(s) _____

Faculty/Staff_____

Current affiliation:_____

Is your address correct on the label? _____ (If not, please include it with corrections.)

Best feature(s) of this newsletter: _____

What would you like to see more of? _____

What could we reduce or eliminate? _____

What did we forget to include? _____

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REMINISCENSES OF THE MATH DEPARTMENT AT THE HARTFORD REGIONAL CAMPUS

by Evelyn Ahlberg

When I joined the faculty in September 1960, the Hartford Branch was located on the property of the Goodwin Estate in the West End of Hartford. The rooms were beautifully paneled, and several had large glass doors that opened onto brick patios. The professionally landscaped grounds were particularly spectacular in the Spring. What a pleasure it was to work in such surroundings!

The Branch was at the Goodwin Estate from 1955 to 1970. Prior to 1955 it had been housed first in the Barnard-Brown school in Hartford, and later on the third floor of the old Hartford Public High School on Broad Street, approximately where an I–84 ramp now exists. The facilities at the Goodwin Estate were limited and as enrollment increased they became inadequate. This led to the move in 1970 to a newly constructed classroom building on the West Hartford Campus of UConn, which was a welcomed "upgrade". One luxury in the new building was telephones in faculty offices. At the old location the faculty telephone was located in the faculty lounge.

I remember well my first faculty meeting, at which the new business included the announcement that Math 99 (Remedial Algebra) was being dropped from the curriculum and a new course, Math 104 (Finite Math), was being added. Another item of new business was that the faculty teaching load would be only 12 semester hours—instead of the former standard of 15.

In 1960, the Math Department at Hartford consisted of Donald Pease (deceased), Betty Navratil Whittlesey (retired), and Charlotte Van Meter (deceased). All members of the Physics Department were expected to teach some math courses and, since I joined the faculty as a member of the Physics Department, that is how I began teaching math. Filbert Momm joined the Department in 1961 and stayed until 1969. Wilber Griswold, the Branch director and former Math Department member, also regularly taught a math course. The evening program was extensive in the sixties, and courses taught during the regular daytime hours were also offered in the evening. Classes were all 75 minutes in length and were taught Monday through Thursday, beginning at 8:00 AM and ending at 9:25 PM. Faculty were routinely assigned to teach evening classes as well as day classes.

From the late fifties through the sixties numerous advanced courses were offered in East Hartford under the administration of Continuing Education. Donald Pease regularly taught half of his course load in that program, teaching complex variables, differential equations, advanced calculus and advanced math for engineers. The program ended in the early seventies with the decline of the defense industry, since most of the students were people from United Aircraft (now United Technologies).

When statistics and computer science entered the University curriculum, those departments had no faculty at Hartford, and so Math Department members taught those courses as well as math courses. At first, Donald Pease taught the statistics courses, but with the advent of computer science, Betty Whittlesey taught statistics. Betty continued to teach both statistics and math for the next ten years.

Judith Lewis joined the Department in 1970, Paul Fallone (retired) in 1973, Bruce Hedman in 1982 and Sarah Glaz in 1998. Peter Laseau and Barry Kolb were also members of the department at Hartford in the seventies.

When the Academic Tutoring Program was begun at Hartford, the math tutoring was done by two part-time faculty, Thelma Smith (retired) and Sandra Nix. Sandra continues to provide the math tutoring as well as teaching part-time.

The annual Klopp award to a Hartford Branch student for excellence in Mathematics was established in memory of Patience Klopp by her parents. Patience was a member of the Department at Hartford from 1953 to 1958. ■

Early Years, continued from page 8:
published papers on hypersonic aerodynamics and the ionization of solid particles. After discovering that the Encyclopedia Britannica was filled with outmoded articles and erroneous information, he wrote a book-length expose, *The Myth of the Britannica*, published in 1964, that received dozens of favorable reviews. Now at the age of 74, Dr. Einbinder is retired and marvels that students are able to search the mathematical literature with a computer and solve difficult problems using Maple or Mathematica. ■

GRADUATE STUDENT NEWS

by Talitha Washington

What are we all up to? Some are graduating, some are attending exciting math conferences, some are growing more pregnant every day. Among the interesting subjects those in the Department are pursuing: applications of mathematics to biology, differential geometry, probability, analysis, algebra, and much, much more.

Some of last year's graduates have accepted post-doctoral appointments: Kristen Moore is at the University of Michigan, Ann Arbor; Eun Heui Kim is at the University of Houston; and Josip Derado and his family have moved to Hotlanta, where he is a post-doc at Georgia Tech. Gui-Hua Fei has gone on to pursue a master's in computer science right in our own backyard—UConn.

Others have found gainful employment. Slaven Stricevic is pursuing research at United Technologies. Rajiv Ghosh Roy is having fun working on computers at MathWorks while he continues his doctoral research. Rajiv and Shohini are expecting a baby in late summer 2000. David Molnar is still a grad student, but also teaches at Holy Cross in Worcester, MA where he is spreading the glorious gateway exams.

The actuarial science students have moved into internships and exciting careers: Tachan Wu—Boston Auto Insurance Bureau; Jeff Mahon—Swiss Bank (NYC); Vera Afanassieva—Zurich Canada; Lei Rao—Hewitt Associates; Suppakit Sattayarath—Thailand Department of Insurance; Chun Lai Xiao—Deloitte-Touche; Ling Wu—Boston Mutual; Zengdi Zhuang—Guardian; Janice Santos—NY Life; and Tibock Lee—Travelers. Wow!

As for the rest of us, we are celebrating the arrival of a new baby mathematician. Naomi was born to Jennie Brenden and her husband, Travis, on February 11, 2000.

Another major event was September's annual math picnic, organized by Muge Kanuni, Yung-Sze Choi and Ioanna Mavrea and attended by festive scientists. Chef Raymond Washington became an honorary member of the department thanks to his scrumptious smoked turkey. Volleyball, soccer and croquet brought out the competitive side of well-fed mathletes.

As for me, I've been on a recruiting trip to my alma mater, Spellman College, in Atlanta, hoping to expand our department with bright young minds.

Wishing you a bright year. ■

GRADUATE STUDENTS CELEBRATE END OF 1999–2000

■

TEACHING INITIATIVES

by Jim Hurley

The Department continues to break new ground in both graduate and undergraduate teaching. Last Fall, Bill Abikoff organized an experimental course whose name—A Computational Survival Course for Mathematicians—captures its goal. Unlike our typical content-oriented graduate courses, this unique (to our knowledge) approach focused not on transmitting mathematical information but on developing the computer skills essential to successful 21st-century mathe-

matical careers. Co-author of two books on programming (with Gary Cornell), Bill has long been known for his TEXpertise and graphics programming. Besides introducing those areas, with the help of other members of the department he illustrated PowerPoint's potential for mathematical presentations, Web resources for research and teaching, and packages (such as Maple, Mathematica and Matlab) for modern mathematical computation.

The course covered a broad range of topics, some involving technologies still under development. In addition to TEX and C++ programming, graphics programming appeared in the de facto standard OpenGL, as did use of the Department's parallel machine (cluster) assembled by Kevin Marinelli. Developing a new course in an area as dynamic as this one required extensive planning and ongoing input from specialists. Bill enticed several colleagues to participate in both design and presentation: from our faculty, Vince Giambalvo; from our professional staff, Kevin; from our grad students, Rajiv Ghosh Roy; from our students, Wesley Most, who studied calculus with Bill and then was a UNIX specialist in the UConn Computer Center. Commenting on the impact of their contributions, Bill said, "I organized a course that required knowledge I did not possess. Others who did shared it with both the class and the instructor in a fashion that reflected both camaraderie and professionalism. The Department is fortunate that those talented and congenial members are so willing to contribute their considerable skills."

The course drew enthusiastic support from our faculty and administration, and also attracted interest from Computer Science and Physics. Although there is still room for improvement, its enthusiastic reception is most encouraging. For a sample of course materials, and links to other relevant sites, visit `www.math.uconn.edu` and click on "A Survival Course...".

Last year's experimental undergraduate teaching assistant (UTA) Stefanie Lagerquist did such an impressive job that Chuck Vinsonhaler expanded the program to a full-fledged makeover of our undergraduate Math Learning Center (MLC) on the first floor of MSB. Under the coordination of new graduate student James Morgan, an energetic band of UTAs worked as support specialists for virtually all lower-division courses. Using the MLC as a base, they offered consulting and tutoring to a record number of students throughout the year. They also graded for calculus and gave end-of-semester review sessions that attracted overflow crowds. Besides handling all scheduling, James photographed the MLC TA's and posted the pictures with staff names and times, and collected careful data on patronage of and satisfaction with the MLC offerings. Several pizza parties he organized promoted esprit de corps among the UTAs and contributed to the good feelings that faculty, UTAs and students alike took away from the first year of this new dimension in undergraduate math learning.

The rest of this article describes Jeff Tollefson's experimental approach to our Math 112–113–114 sequence, and is adapted from his piece in Wiley Publishing's newsletter *Focus on Calculus*, Issue 17 pp. 5-6,

Students who fail the calculus readiness test formerly took a traditional precalculus course and then went on to the two-semester single-variable calculus course. Now they take a three-semester sequence from Wiley's text *Calculus, Single Variable* by Hughes Hallett, Gleason et al. The leisurely pace provides ample time to address student deficiencies in algebra and trigonometry, in the context of their place in calculus rather than as isolated rote remedial topics. The goal is to promote both solid conceptual understanding and the computational skills required to apply calculus successfully. The small (30-student) classes require TI 82–86 graphing calculators, employ biweekly small-group projects, and administer basic-skills gateway tests in algebra, differentiation and integration. The formal instruction is backed up by peer tutoring in the dorms, consulting with undergraduate TAs, and biweekly undergraduate TA-led review sessions. Typically, each week addresses two sections of the text in four 50-minute periods. This pace allows time to seek true mastery of the material, to devote attention to background issues as they arise, and for students to start (and often complete) in-class group projects. The latter, one for each section of the text, prepare students for the homework and are often similar to less routine text exercises.

Early in the course students discover that they can solve calculus problems with a calculator, and so their problems with algebra need not doom them in calculus. Basic-skills gateway exams are given each semester starting in the third or fourth week. They cover many skills that students should have mastered prior to entering the course, as well as basic computational differentiation and integration. No partial credit is given on gateway-exam questions. An exam grade of 0 is assigned to any score lower than 70%, but the gateway tests may be retaken as many times as they are offered. Only the highest score is retained. Retakes are offered once or twice a week throughout the semester. Even students with an 80% or 90% on the first try often retake the tests as many as 6, 7 or 8 times in an effort to achieve better scores. In so doing, they drill themselves throughout the semester on computational skills that they formerly paid all too little attention to.

When algebraic skills are taught, the student has immediate motivation and applications—factors not always found in a precalculus course. Students seem to develop a good attitude towards learning mathematics, work hard and interact well in the classroom. The approach offers the dedicated teacher a framework in which to successfully teach calculus to students with gaps in their preparation. ■

DEPARTMENTAL WEB SITE A TEAM EFFORT

by Alan Stein

In the beginning of the Wide World Web era, the Mathematics Department web site was put together almost singlehandedly by Computer Coordinator Kevin Marinelli.

Today, just as it takes a village to raise a child, it takes a team to maintain and enhance a web site—and the Mathematics Department has a team that has been enhancing and reorganizing its site. The team's lead-off hitter was Jiri Horak, one of our graduate students, who won a competition in the Fall 1998 semester for the redesign of the home page.

In the Spring 1999 semester, I came off sabbatical leave and became the new web master, working with the already existing departmental web team (Computer Coordinator Kevin Marinelli and Professors Vince Giambalvo and Jeff Tollefson) along with other faculty (Kinetsu Abe, David Gross, Roger Hansell, Jim Hurley, Gerald Leibowitz, Dick London, Chuck Vinsonhaler), students (Jian Fang, Caragh Murphy, Mark Vaccari, David Molnar), and staff (Carol Roberts, Arcelia Bettencourt).

The web site is a constantly changing blend containing information about programs, courses, faculty, staff and graduate students along with links to numerous outside resources.

If a student wants to double check her instructor's office hours, she can do it by checking the listing on the departmental web site, which is generally updated shortly after each semester begins. Every faculty member now has a home page, which is linked to in the faculty directory, and many include course information, including syllabi. Vince Giambalvo maintains a directory of course pages, including links to the course home pages maintained by the lead professors for each course.

David Gross provides general information about the undergraduate program for the departmental site, while Dick London provides information about the actuarial programs (undergraduate and graduate) and Kinetsu Abe provides information about the graduate program.

The list of textbooks used for each course is provided by Carol Roberts and is generally available on the web site long before it's available from the UConn Coop.

Many high-school students obtain credit for UConn mathematics courses through the Advanced Placement Program and the University of Connecticut Co-op Program. Jim Hurley, director of the Co-op Program for the Mathematics Department, provides current information for the departmental web site about those programs.

In the future, the Math Department's web site will contain advice for students trying to decide which courses to register for as well as general advice about studying mathematics.

Inevitably, as changes are made both on the department's web site and elsewhere, errors creep in but they generally don't last very long, since Jerry Leibowitz usually notices them very quickly and lets the web master know.

For anyone with any suggestions, either for the web site (`http://www.math.uconn.edu`) or anything else about the department, the web site also contains a suggestion box!

Key Links

Home Page
`http://www.math.uconn.edu`
Undergraduate Studies
`http://www.math.uconn.edu/Undergraduate`
Textbooks
`http://www.math.uconn.edu/Undergraduate/textsfall2000.html`
Graduate Studies
`http://www.math.uconn.edu/Graduate`
Actuarial Program
`http://www.math.uconn.edu/Actuary/`
Course Pages
`http://www.math.uconn.edu/CoursePages`
Class Schedules
`http://www.math.uconn.edu/Schedules`
Seminars and Colloquia
`http://www.math.uconn.edu/Talks`
Computing Resources
`http://www.math.uconn.edu/Computing`
The High School Cooperative Program
`http://www.math.uconn.edu/CoopProgram`
Faculty and Staff Directories
`http://www.math.uconn.edu/People`
Mathematical Resources
`http://www.math.uconn.edu/Miscellaneous/mathlinks.html`
Suggestion Box
`http://www.math.uconn.edu/Miscellaneous/suggestionbox.html`

FRESHMAN YEAR EXPERIENCE SEMINARS

by Stu Sidney

In Fall 1998, the University of Connecticut began offering freshman and sophomore students one-credit faculty-taught seminars on just about anything, under the course listing Interdepartmental 182: Freshman Year Experience Faculty/ Student Seminar. According to its catalog description, the course is intended to "help students learn independently and engage actively in the academic life of the university." Less formally, the intent is to expose freshmen and the occasional sophomore to faculty in an intellectual setting that is geared not to curricular requirements, but instead to shared explorations of areas of mutual interest. Beginning students can make contact with cutting-edge ideas that might otherwise demand a long preparatory chain of background courses. The seminars are capped at twenty students, but often enrollment is in the single digits.

To give an idea of the variety of topics, here is a list with one from each semester so far: Romans, Rabbis, Magicians and Messiahs: The World of Ancient Palestine; The Air We Breathe: How Safe Is It?; What Does That Have To Do With History?; and My Family Mirror: Self Revelation Through Family Exploration.

The Mathematics Department has contributed its share each fall. In 1998 Domina Spencer offered Physics—What It Is and How It Affects Us, and for 1999 Chuck Vinsonhaler and Stu Sidney collaborated on Can Math Solve All Your Problems?

Domina's Fall 1998 seminar focused on the development of the postulate on the velocity of light. Various postulates have been proposed, most famously by Einstein early in the twentieth century, and alternative versions continue to be developed; Domina and her associates are very active participants in this movement. Thus the focus of the course reflected a deep interest on Domina's part. In addition, the material could be handled in a pretty elementary way, using some geometry. Students were required to submit a paper, either outlining the life and work of one of the scientists who came up in the course (e.g., Einstein and Galileo), or describing one of the experiments Domina discussed with them. In these discussions, actual data were presented and analyzed.

Chuck and Stu's 1999 seminar was interested more in the problem-solving process than in particular content. Riddles, puzzles and games occupied most of the class time. For example, the semester began with a number of two-person games in which several piles of beans are placed before the two participants, and each in turn removes some of them while following a few rules; whoever removes the last bean wins. The Monty Hall game (behind one door there is a valuable prize, behind the other two lurks something very unpleasant …), World Series won-loss records, and building as long a bridge as possible by balancing rods of equal length on one another illustrate some of the other problems and activities in the seminar.

All three participating mathematics faculty members enjoyed the seminars. Teaching a pure elective for students who have freely chosen to be there can be a wonderfully exhilarating experience.

■

UNDERGRADUATE GRADUATION RECEPTION

GRADUATE DEGREES AWARDED

The following people received graduate degrees from the Department in the past year and one-half. They are listed, each with the advisor's name in parentheses, and for PhD students, the title of the doctoral dissertation and present employer.

Master's Degree recipients:
Mathematics: Tho Phuoc Huynh (Wickless), Jonathan Keiter (Tollefson), Ioanna Mavrea (Wickless), Jason Molitierno (Neumann), Ermek Nurkhaidarov (Wickless), Talitha Washington (Wickless).

Actuarial Science (advisor Vinsonhaler): Igor Afanassiev, Vera Afanassieva, Kelly Bowler, Serdar Ciris, Jian Fang, Jiang Fu, Fuchang Gao, Young-soon Kim, Chen-Yi Kuo, Hong Li, Yuan Liu, Yen-Ping Lo, Lei Rao-Knight, Guy Rasoanaivo, Janice Santos, Chunlai Xiao, Yingnian Wang, Wenjie Wu, Chen Yu, Zengdi Zhuang.

PhD Degree recipients:
Chin-Mei Chueh (Vinsonhaler), "Stochastic Economic Modeling for the Deferred Annuity Line of Business," University of Wisconsin at Eau Claire.

Josip Derado (Gröchenig), "Multivariate Refinable Interpolating Functions," Georgia Tech.

Guihua Fei (Kim), "Periodic Solutions of Hamiltonian Systems and Minimal Period Problem," University of Minnesota at Duluth.

Fuchang Gao (Blei), "Majorizing Measures and their Applications," University of Idaho.

Reo Gonzales (Koltracht), "Integral Equation Method for Schrödinger Equations," Checkfree Investment Services.

Ensil Kang (Tollefson), "Normal Surfaces in Knot Complements," Korean Advanced Institute of Science and Technology.

Yow-Ming Kang (Vinsonhaler), "Analysis of the Provision for Adverse Deviation in Payout Annuities," Frank Russell Co.

Eun Heui Kim (Choi), "On the Existence of Positive Solutions of Quasilinear Elliptic Boundary Value Problems," University of Houston.

Kristen Moore (McKenna), "Large Amplitude Torsional Oscillations in a Nonlinearly Suspended Beam: a Theoretical and Numerical Investigation," University of Michigan.

Slaven Stricevic (Blei), "Continuous-Time Models of Generalized Random Walks," United Technologies Corporation.

Leiping Yu (Abe), "An Alternative Approach to Critical Point Theory and its Applications to Hamiltonian Systems," Trinity College. ■

ANNUAL AWARDS CEREMONY

The Mathematics Department Annual Awards Ceremony was held on Thursday, April 27, 2000. The gathering was welcomed by Professor Stuart Sidney, and addressed by Professor Ron Growney, Associate Dean of the College of Liberal Arts and Sciences. Then achievements of the following students were recognized:

- Alicia Emanuel, David Futterleib, Kyle Puffer and David Sedich received CIGNA Awards, which recognize outstanding students majoring in Actuarial Science.

- Calculus Competition awards went to the following students:
  Keegan Finlayson (first place, overall);
  Erik Pukinskis and Julie Treadow (tie for the following: second place overall; first place, intermediate; first place beginner);
  Egon Salimusaj (third place, intermediate);
  Steven Boyden (fourth place, intermediate);
  Scott Kraft (third place, beginner).

- Paul Navratil received an award for noteworthy performance on the William Lowell Putnam Competition.

- Burkhard Englert and Mihai Pascu received the Louis J. DeLuca Memorial Scholarship Award, which recognizes the outstanding Teaching Assistants of the year.

- Jason Molitierno received the Connie Strange Graduate Community Award, which recognizes service to the Graduate Student Community.

- Dan Furlani, Jonathan Keiter, Jacqueline Madore, Ioanna Mavrea, Paul Navratil, Kyle Puffer, Kristin Roti and Alisa Schock were inducted into the Pi Mu Epsilon Honor Society.

- Dan Furlani received a certificate recognizing successful completion of the Mathematics Scholar Program.

The Keynote Address, "It is Time for Mathematicians to Come…Out of the Closet" was delivered by Professor Dennis Luciano, Western New England College.

■

Dept. Head, continued from page 1:
Southampton University in England during 2000 and 2001. Changfeng Gui, who joined us last fall, was awarded the André-Aisenstadt Mathematics Prize by the Center for Mathematical Research in Canada. Joe McKenna received the Ford Prize for his article on suspension bridges in the American Mathematical Monthly.

continued on page 19

Dept. Head, continued from page 18:
Some innovative changes have been made in the undergraduate program. As Jim Hurley's article on Teaching Initiatives describes in more detail, the three-semester calculus sequence Math 112–113–114 is incorporating gateway skills testing to promote a better grasp of basic techniques. Under the direction of graduate student James Morgan, the Mathematics Learning Center has expanded operations. It is now staffed primarily by undergraduate TAs, each of whom is affiliated with a specific course. In addition to being available at regular hours in the Center, the UTAs run problem sessions and help with homework and quiz grading. Student reaction has been overwhelmingly positive, from both the tutors and the tutees.

The Actuarial Program celebrated its 20th anniversary with a banquet in the fall. Some 130 graduates came to share life stories and get a look at the changing face of the Storrs campus. Director Dick London has taken the program several giant steps forward and hopes to help hire a permanent replacement before he moves on to golf greener pastures. Two students, Yvonne Chueh and Frank Kang, wrote doctoral dissertations in actuarial science, on problems that arose in their work under Jay Vadiveloo at Aetna Financial Services. They were part of the graduate internship program created by Jay, a program that was adopted by Hartford Life in the fall. Yvonne accepted an Assistant Professor position at the University of Wisconsin, Eau Claire, and Frank took a job with Frank Russell Company in Tacoma, Washington.

Other graduate students who completed PhD degrees this year include Josip Derado, Guihua Fei, Fuchang Gao, Reo Gonzales, Eun Heui Kim, Slaven Stricevic and Leiping Yu. Their achievements and plans are described elsewhere in this newsletter.

In October, our department was reviewed by a three-man team: Robert Olin, Department Head of Mathematics at Virginia Tech, Frederick Gehring, Emeritus Professor at Michigan and member of the National Academy of Sciences, and Erling Murtha-Smith, then Associate Dean of the School of Engineering at UConn. The team spent two days talking to various groups of students, faculty and staff, and collecting data. Then they issued a helpful report that recognized our strengths and made suggestions on how we might improve. We are now working on a response that will turn into a "Memorandum of Understanding" between the department, the Dean and the Chancellor.

You'll find details on many of these items and more inside. Read and respond!

■

STU'S PUZZLE CORNER

Pick a number...

As in the previous volume, we offer a sequence of three related problems of increasing sophistication. Please offer suggestions or solutions via e-mail to: `sidney@math.uconn.edu`, or surface mail to:

Stuart Sidney
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Storrs, CT 06269-3009

We plan to publish the first correct solution submitted to each problem in the next issue of this newsletter.

Our problems are from probability, but you can treat the necessary probability pretty intuitively, interpreting it in terms of volumes (in appropriate dimensions). Imagine selecting at random and independently a sequence $x_1, x_2, \ldots, x_n, \ldots$ of numbers from the open interval $0 < x < 1$.

1. (The warm-up) With probability 1, the sequence of selected numbers is dense in the interval $0 \le x \le 1$, that is, every number in the interval can be arbitrarily closely approximated by numbers from the sequence. Prove this.

2. (The main event) This is a favorite old Putnam problem. **On the average**, how many numbers will have been selected when their *sum* first equals or exceeds 1? [Technically, *on the average* means this: Let N denote the number of terms of the sequence required in order that their sum be at least 1. N is a positive integer that depends on the particular sequence that has been chosen (so it is a *random variable*); there *are* sequences for which N is infinite, but they can be ignored, inasmuch as they form a set of probability zero. For each positive integer n let p_n denote the probability that $N = n$. Then the number we are looking for is the *expected value* of N, namely,

$$E(N) = \sum_{n=1}^{\infty} n \cdot p_n \ . \ ]$$

3. (The encore) Again **on the average**, how many numbers will have been selected when their *product* is less than $1/e$ for the first time? ■

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