

Chair's Column

By Jon Maatta

I'm writing this column before I've had a chance to move down the hall to the southern end of the third floor of Hyde Hall. On June 1, 1999, I assumed the responsibilities of the chair of the Mathematics Department. I expect that the job will be challenging and at times frustrating. Ultimately, I believe it will be an exciting and interesting three years.

Enid Burrows, our most recent chair, has left Plymouth State College and the Mathematics Department for a new position as Dean of Russell Sage College in Troy, New York. This represents an exhilarating opportunity for Enid and we wish her well. For those of you who wish to contact Enid, her new address is Dr. Enid Burrows, Dean of Russell Sage College, 45 Ferry Street, Troy, NY 12180. (Her e-mail is burroe@sage.edu).

Many interesting developments occurred in the past year. One topic that held our interest for most of the year was our department self-study and subsequent review. See more on this issue later in Bernadette Russek's column.

Curriculum Development

The college-wide mathematics requirement on the books for over a quarter century has been changed. Regularly admitted students no longer are required to demonstrate competency in high-school algebra skills (via the old Mathematics Proficiency exam.) The old proficiency requirement has been replaced with a foundations requirement which requires the student to take a mathematics course numbered 150 or above. We believe that the new requirement creates a stronger mathematics component for all students at PSC. This June's orientation sessions saw only approximately 120 students (vs. over 900) taking the new placement exam, which is designed to place those students needing calculus in either Calculus I, Applied Calculus I, Elementary Functions or the recently created College Algebra Course.

Other curriculum/course changes this year included the creation of MA311: Logic, Proofs and Axiomatic Systems. This course will stress proof development and has a prerequisite of Calculus I. The calculus sequence was changed from the old four semesters of 3 credit hours each to three semesters of 4 credits in hopes that our mathematics students (and other students needing calculus) will complete the calculus sequence in a more timely fashion. Of course, there will be a transitional period for those students who started in the old sequence.

Technology News

The department has continued to write Computer Advisory Board (CAB) proposals for new computer equipment. Faculty and staff now appear to be on a three-year cycle of upgrades for computer hardware.

The predominate software used is Minitab for statistics and Mathematica for calculus. After

a rough fall-semester, our new computer lab equipped with the new iMac-G3's is functioning well and is being utilized more by both faculty and students.

The first stage of our multimedia classroom will be completed this summer and will include a smart white board, PC and MAC computer links, an overhead projection device, and capability for satellite hookup. This room gives faculty the capability to present students with the latest and greatest in technology.

Mathematics Banquet

The Second Annual Mathematics Department / Mathematics Association of Plymouth (MAP) banquet was held at the Italian Farmhouse and was a huge success. Again this year the banquet was attended by nearly all the Mathematics faculty and by many students and parents. Dr. Richard Evans gave the keynote address about his journey to Australia. The Map awards were given honoring students and faculty. Dr. Burrows received special recognition for her many years of contribution to the department and students. As you probably can tell, the MAP is going strong and looks forward toward fall with Rachel Lorenz as newly elected president.

The MAP is interested in hearing from you. Please send your address and brief note of your activities to the Mathematics Department or send us a note via e-mail to euclid@mail.plymouth.edu .

The Mathematics Major

The total number of mathematics majors for the past-year was 44 with most of those students enrolled in the education option (25 Math-Ed, 5 BA's in Mathematics, and 14 in the BS option). These numbers are down slightly from the 1990-91 academic year, but down by a larger margin from the peak enrollment in 1992-93. The job market currently is excellent for any type of mathematics degree with most of our students finding jobs in education, insurance companies, or with computing firms.

Talent Grant in Mathematics

The Plymouth State College Talent Grant in Mathematics program continues to progress slowly. The grant is a renewable, two thousand-dollar award for first-year New Hampshire residents. Mathematics educators of New Hampshire, if you have potential mathematics majors, please keep us in mind.

Alumni News by Ted Giebutowski

Since last you saw this column: I ran into Roger Tessier '87 at the 'Math Counts' competition held here during our spring break, He is now teaching at Bow, NH high school and has been enjoying it for two years. (My apologies to the other alums I missed seeing there, I was just in doing some work, not helping with judging.) I also had e-mail in

September from Gary Lowe '92. Gary's working as a research associate for an asset management company, State Street Global advisors in Boston. He builds and maintains stock, commodities/futures, bonds and currency models. He writes that he uses his statistics daily, and had also recourse to his Advanced Calculus course, using Hermite Polynomials in an asymptotic expansion of an arbitrary probability density function. He notes: "If any PSC math grads would like to ask about math jobs that don't involve insurance, please give them my e-mail address." His address is: Gary_S_Lowe@ssga.statestreet.com.

In November, Paul Estes heard from Fangyu Chi '94, who was finishing her MS in Computer Science at SUNY at Binghamton and about to start a job search.

Keith Ferland got a December e-mail from Mike Seery '76. Mike teaches at the U. S. Airforce Academy Prep school (in Colorado) and has recently given a talk on pursuit curves at a regional MAA meeting, publishing a paper on the same topic in the College Mathematics Journal. His wife, Martha teaches math at the local high school. He asked for an occasional AfterMath article on the faculty's latest mathematical interests/fascinations. See the next article!

Dick Evans got an e-mail from Dave Muzzey '91. He's in his fourth year teaching at Kearsarge HS and now the Mathematics Department Head. He wrote volunteering Kearsarge as a site for our student teachers. Thanks, Dave. Also, Lovell Morrison '94 passed on to Dick that he's now teaching math at Stratford (NH) High and has 2 little boys.

If I've left any one out who has communicated with us recently, my apologies. I'll try to do better next time. I generally pick up these tidbits from others in the department on a by guess or by gosh basis and pass them on here. If you have some news you'd specifically like to share here, write or e-mail (tedg@oz.plymouth.edu) me here. If you want to get another math alum's address write or e-mail our secretary, Wendy Burnham (wburnham@mail.plymouth.edu).

What's the Shape of our Space? by Keith Ferland

Mathematicians (Topologists in particular) are working with Cosmologists to answer this question which has challenged humanity for thousands of years. Is the universe finite? Is its curvature positive, negative, or zero? How does time affect the shape of space? All of these questions may be answered within the next several years with the help of a NASA satellite set for launch in 2000.

Topologists have been studying the theoretical possibilities of the shape of the universe (identified as a three-dimensional manifold) for the last two centuries. For example, a finite space with positive curvature could be the 3-sphere which of course resides in 4-dimensional hyperspace. However, if time is considered as another variable (as Einstein's Theory of Relativity suggests) then the space-time structure of our universe actually resides in 5-dimensional hyperspace. So you can see the relevance of the theoretical but not necessarily

abstract concepts of mathematics to the understanding of our position in the cosmos.

Mathematics has traditionally been ahead of the sciences. Newton, three hundred years ago, derived the equations (based on the conic sections from the early Greeks) needed to allow us to send space crafts to Mars and beyond. Base two arithmetic, used in computers and artificial intelligence machines, has been around for centuries as well. So it should be of no surprise to finally observe that our universe is some standard mathematical structure such as a 3-sphere, 3-torus, 3-Klein bottle, etc.

One of the topologists working on this project is Jeffrey Weeks. He has written a book "The Shape of Space" which has an excellent layman-level description of the mathematics of space and space-time. Another great reference is a book by Robert Osserman, "Poetry of the Universe" and there is an article in the December 98 issue of the "Notices", an AMS publication, titled "Measuring the Shape of the Universe"! Check out these sources and be ahead of your friends when the truths of the cosmos start to reveal themselves over the next few years.

Math Association by Jennifer Bonang

It has been another great year for the Math Association. Everything that we did was a huge success and I hope that it continues this way through the years. Some of the things that we did were: attended a talk about the school system in Australia, a Faculty/Student Christmas Party, a hike to Welsh and Dickey, and of course our Faculty/Student game night in the HUB.

But the best event of the year was the Annual Mathematics Awards Banquet. This year it was held at the Italian Farmhouse and the food was out of this world. Dr. Richard Evans was our keynote speaker for the evening and he showed us slides and talked about his trip to Australia. We then handed out the awards. Debralee Held, Rachel Lorenz, and Mandy Rockwell received appreciation awards for their hard work and dedication to the association. Dr. Jon Maatta, association advisor, and Dr. Enid Burrows also received appreciation awards for their continuing support to the association. The next award was the Distinguished Mathematics Professor award, given to Professor Richard Evans. This award is voted on by all mathematics majors and is given to the professor that the students feel has done an outstanding job this year. The following people then received an award for being "Outstanding in Mathematics:"

First-Year

- Jeremy Donovan, Scott Laine, Brooke Randall, Michael Severino, Zachary Stephen

Sophomore

Rachel Lorenz

Junior

Danielle Aube, Kate Shannon

Senior

- Jennifer Bonang, Stan Boyd-Robertson, William McElroy, Peter Slaski, Eric Stone

The evening ended with special recognition for Dr. Enid Burrows. She has done so much for the association and will be greatly missed as she takes a position as Dean at Russell Sage College. Thank you, Dr. Burrows!!

I would like to thank everyone for such a great year and I hope that everything goes well in the future. The incoming officers for the next school year are:

President - Rachel Lorenz

Vice President - Philip Pane

Secretary - Nicole Demers

Treasurer - Jeremy Donovan

I know that next year will be just as great if not better!! I wish all of you luck and will miss you all greatly.

Ace Algebra with Graphing Calculators
By: Bill Roberts

During Summer Session II PSC is a site for the Algebra with Graphing Calculators I institute from the Teachers Teaching with Technology Program at Texas Instruments. This institute is a weeklong professional development program for teachers of pre-algebra and algebra I. The primary focus of the activities is to explore pre-algebra and algebra concepts and problems using hand-held calculator/computer technology as a tool for teaching and learning mathematics. The goal of the institute's program is to instruct teachers in new and innovative ways to effectively teach mathematics using technology in the spirit of NCTM's *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989) and *Professional Teaching Standards* (NCTM, 1991). This institute will commence on June 28.

This is the seventh consecutive summer that we have offered one or more institutes from the Teachers Teaching with Technology Program. In previous summers, the institutes have included topics involving the teaching of algebra, geometry, precalculus, calculus and statistics with technology. This will also be the seventh summer that John Hanna, a T³-Teachers Teaching with Technology National Instructor, will be returning to Plymouth to conduct a T³ institute. Many of you that have attended institutes in previous summers have

asked about John and some of the materials that he makes available. These materials are available through John's web page that is located at <http://vangogh.bergen.org/~tejohhan>. Visit John's page and you are sure to find something that will be very interesting. A nice graphing calculator document *Graph-Link: The Brief Course* is available on the following page: (<http://users.bergen.org/~tejohhan/graphingcalculator.html>).

Last Fall John was the Winner of ticalc.org's "Program of the Week Award" for 09/20/98. Many of you may find this program useful. Why not check it out? (Visit John's homepage)

John Hanna wrote IVIEW95 v2.7. This is an excellent graphics utility for Windows that allows you to view and edit image files for almost every TI graphing calculator. Reference: www.ticalc.org/features/newsletter/1998-09-20.html

ACE I — Algebra with Graphing Calculators
The Mathematics Department Review
By: Bernadette Russek

This year we conducted a review of the department, its programs, its goals, what it has, and what it needs. To help in this effort a Self-Study Committee prepared a comprehensive report that describes the department's programs, recent changes and recommendations, the department's view of its mission, resources and needs, and a survey of its own recommendations toward strengthening the mathematics major and service programs. The Committee submitted a copy of this document to the department, to the Dean, and to an outside reviewer: Don Kreider, retired Professor of Mathematics and Computer Science (and former Department Chair) at Dartmouth College.

This report included a description of the major programs, the department mission, actions taken in the eight years since the last review. It also includes descriptions and lists of our resources, recent modifications of programs and courses, our proposal for the college-wide mathematics foundation requirement, and a new graduate program proposal. In addition, there are pages of statistics of course enrollments, numbers of graduates in undergraduate and graduate programs, and "much more".

Professor Kreider was invited to visit the department and give us his view of our programs and condition. He talked with many people: members of the mathematics department, part-time lecturers, students majoring in mathematics and other disciplines, the Director and student tutors in the Mathematics Activity Center, with the Dean, and faculty from other departments. The two-day schedule was extremely tight, but everyone felt that the visit was comprehensive and thorough.

We feel we profited greatly from the process as well as from the visit and report of the reviewer. We were made aware of a number of colleague activities and accomplishments, and had opportunity to discuss where we are and where we wanted to go.

Professor Kreider sent us a seventeen-page report; a guiding question as he gathered

information was, "How well has the mathematics department conceived and developed its programs to meet the needs of mathematics itself, its students, the departments that depend on strong mathematical infrastructures, and the general College mission?" Of all of these aspects, the one most appropriate to outline here is the importance of the mathematics majors and the urgent need to strengthen them. He detailed two fundamental recommendations having to do with strengthening the major and moving to consistent departmental policies and positions in the introductory and service courses.

Kreider suggests that the department "begin immediately a year-long study of the major, with an eye to making it highly visible, stable, and attractive to a wider pool of students". In the specific recommendations, he advises that we offer senior capstone courses and add one or two new honors courses that can serve to attract bright students at Plymouth State College into mathematics. To address any feelings of "instability" in the major that may discourage incoming students from mathematics, he suggested considering a three-year prospectus cycle that "guarantees" to the students which courses will be offered, and when.

He recommended that the department come to an understanding of the needs of the students in the service and gateway courses. Specific attention should be directed to issues of teaching environment, active involvement of students in the learning process, and proper level and use of technology in teaching the courses. In line with this latter issue, he recommends that the department resolve the issue of the use of technology in the introductory and gateway courses (and selected upper level courses).

Kreider observed that, "the rather remarkable number of changes made in mathematics programs since the last external review eight years ago, accelerating in recent years, speaks to the department's acceptance of its leadership responsibility" and that "the department appears poised to pull itself together for the next essential steps, building on its self-study".

Math-Ed at PSC

By: Dick Evans

NH-IMPACT Grant: PSC received a grant from the Center for Enhancement of Science and Mathematics Education to establish a mathematics and science curriculum center for New Hampshire. The NH-IMPACT Center is designed to assist NH teachers and school districts in implementing new, standards-based mathematics and science curriculum. **Dick Evans** will serve as the Director for the Center. **Judy Buck** will serve as the Mathematics Advisor, and **Warrant Tomkiewicz** and **Mark Turski** of the PSC Natural Science Department will serve as the Science Advisors. Former NH State Mathematics Consultant Ferd Prevost will serve as the Implementation Advisor for the Center For more information about the Center contact Ferd Prevost at 535-2985 or by email at: fprevost@mail.plymouth.edu.

Mathematics Institutes this Summer at PSC

Data and Chance Institute for Middle School Teachers: Dr. **Judy Buck** of the PSC Mathematics Department received a grant from the Eisenhower Title II funds for higher education to have 25 middle school mathematics teachers become familiar with the NSF standards-based program materials for probability and statistics. The institute will be conducted the week of August 9 — 13, 1999. **Dick Evans** will help Judy with the day-to-day presentations. Participants will receive two graduate credits, lunch each day, and over \$100.00 worth of curriculum materials. There is a fee of \$150.00 for attending the institute. For more information contact Judy Buck at 535-2564 or via email at jcurran@mail.plymouth.edu.

Early Algebra Institute for Middle School Teachers: Judy Buck also received a grant from the Eisenhower Title II funds for higher education to have 25 middle school mathematics teachers become familiar with the NSF standards-based program materials for algebra. The institute will be conducted the week of July 26 — 30, 1999. The institute is structured similarly to the Data and Chance nstitute above.

Primary Mathematics Institute: **Dick Evans** received a grant from the Eisenhower Title II funds for higher education to have 20 primary teachers explore ideas of teaching mathematics in the primary grades. The institute will be conducted the week of August 2 — 6, 1999. Participants will receive two graduate credits, lunch each day, and over \$100.00 worth of curriculum materials. There is a fee of \$150.00 for attending the institute. For more information contact Dick Evans at 535-2487 or via email at evans@mail.plymouth.edu.

Algebra with Graphing Calculators I Program: **Dr. Bill Roberts** of the PSC Mathematics Department received a grant from Texas Instruments to host a week-long institute using the graphing calculator to teach algebra. The Institute will be conducted the week of June 28 — July 2, 1999. Participants can receive two graduate credits. There is a fee of \$250.00 for attending the institute.

Australian Math Course for Teachers of Grades 3-8: **Charles Lovitt**, the Director of the Curriculum Corporation of Australia, will be returning for the third summer to teach a two-credit course on using the Task Centre Approach to Learning Mathematics. The course will run the week of August 2-6, 1999. The fee for the course is \$437, which includes registration and two graduate credits.

Spring 1999 Kudos
By: Paul Estes

Outstanding Math Major Award

This spring at Last Convocation the department honored Alicia Morin from Laconia as its outstanding graduating senior. Alicia completed her student teaching at Kingswood Regional Highschool in Wolfesboro NH. And we have recently learned that Alicia has been hired by Kingswood for a full-time position in the fall.

Mathematics Department Fellowship

The Mathematics Fellow for fall 1999 will be Brian Harrington from Northfield NH. This fellowship involves working in the Math Activity Center helping students with problems in Calculus and Elementary Functions. As the recipient of this award, Brian will receive a stipend which is credited toward his tuition.

Mathematics Scholarships

Jennifer Bonang, from Warwick RI, who was this year's Math Fellow, won the Barbara Dearborn Mathematics Scholarship. Barbara's daughter Mitzi Dearborn returned from Wisconsin to make the presentation to Jen.

The Hunter Baney Barton Memorial Scholarship alternates between our department and the Natural Science Department. This year it was our turn to select the recipient. Our choice: Danielle Aube from Berlin NH.

We were able to award three Geneva Smith Scholarships this year. Geneva Smith was the former Math Department professor for whom the dormitory Smith Hall is named. The three Geneva Smith Scholarship recipients were Kate Shannon from Groveton NH, Brian Harrington from Northfield NH and Raleigh Lapierre from Haverill MA.

Math Activity Center (MAC) Update- By Jack Barry

With the completion of spring semester 1999, the MAC has turned the page on its thirteenth semester of operation. On behalf of the thousands of math students supported by the MAC, I would like to take this opportunity to thank all the mathematics majors (tutors), past and present, for their hard work and dedication in support of the PSC community. The MAC through the commitment of its tutors, Math Dept. Faculty, and Administration has been a successful adjunct to the mathematics program. The MAC continues to provide a haven for the pursuit of success and excellence in mathematics for both math majors and non-majors alike.

For any additional information please feel free to contact me, Jack Barry, at (603) 535-2819 or email j_barr@mail.plymouth.edu.

Mathematics Meeting in San Antonio By: Larry Blaine

The annual MAA/AMS mathematics meeting was held last January in San Antonio, Texas. Keith Ferland and I represented PSC. We stayed on the top floor of an old hotel downtown, and could look down on the Alamo.

This meeting was very rewarding professionally-so many interesting talks and workshops were going on that I sometimes had considerable trouble deciding which one I would go to

at a given hour. The ones I chose included presentations on numerical analysis, the history of mathematics, and the connections between mathematics and music.

These national meetings often provide a chance to renew old friendships. For instance some of you old-timers may remember Dan Swensen, who taught philosophy at PSC in the 80's, or Paula (Stanley) Swensen, a 1988 PSC mathematics graduate. Dan is now at Schreiner College in nearby Kerrville, Texas, and Paula has just emerged (successfully) from law school at Cornell University. They were in town one evening, and we met for dinner and had a fine time reminiscing about the good old days.

Keith, proud papa, met son Kevin and daughter Alaine, *both* of whom were just finishing their doctorates in mathematics, and were at the meeting to interview for jobs.

Editorial comments
By: Ted Giebutowski

To 'fill in some blanks': Those of you interested in courses offered in the evening at PSC, whether as part of a graduate program or otherwise may be interested to know that we are offering MG 451, Advanced Calculus I and a section of MG 330, Statistics II in the evening this fall; and MG 452, Advanced Calculus II and MG340, Time and Money in the spring. For the fall, I will offer the Advanced Calculus I on Tuesday and Thursday evenings from 6:30 to 7:45 and Bob Hayden will offer MG 330 from 5 to 6:15 the same evenings. This would enable gluttons for punishment to sign up for both!

Also, this summer session II, Larry Blaine will teach the course: MG586: Topics in Mathematics for Middle/Secondary Teachers — Game Theory, MWTh, 10:00 — 12:45, July 5 through August 5. I can vouch that Larry has some neat applications of Game Theory to all sorts of situations; it's a particular interest of his which should make for a wonderful course.

This issue should also be going to our grad alumni and currently enrolled M. ED. Students in mathematics, as well as our undergrad alumni and students. If you hear of any one whom should be getting this and isn't, let us know.

As you can see from this and previous issues, our math grads are doing just fine getting jobs. Those of you with ties to PSC who are educators can do us a great service by sending us some of your better students (thanks in advance!).

Lastly, Lorraine Paquette, our longtime secretary who planned to retire at the end of June has left her position early due to illness. For those of you who may wish to send a card, her address is: 3 Hillside Ave., Ashland, NH 03217. I'm sure all who knew her join us in wishing her a speedy recovery and a happy retirement.