math at andrews

Number 1 March 2002
A newsletter published occasionally by the Department of Mathematics, Andrews University, for its alumni, former mathematics students, faculty, and other interested persons.

Greetings. This is the first issue of a newsletter for Andrews math alumni which we hope to produce a couple times per year. Following are some "thumbnails" of significant events since 1998. Some will be expanded upon elsewhere.

1998-99: Long-time chair Ken Thomas retires to Scotland and becomes Professor Emeritus. In addition to serving Andrews for 13 years he taught at Helderberg College and was President of the Zambia Union Conference . His e-mail is thomas@wanderershome.freeserve.co.uk. Ted Hatcher assumes the chairmanship. This is Ted's second stint as chair of the department.

1999-2000: A year dominated by preparations for the **change from quarters to semesters.** Old-timers may remember the original shift from semesters to quarters, which took place in 1967 under the aegis of President Richard Hammill. (In his memoirs he says he soon regretted the change.) Ted Hatcher spends many hours studying our courses and combining them into semester courses, and in the process achieves lower teaching loads (not more than three per semester) and less duplication of offerings.

Three Emeritus Professors: Edward Specht, Ken Franz, Ted Hatcher, at Ken's retirement party, October 2001.

2000-01: Edward Specht is elected Professor Emeritus. He chaired our Department from 1947 to 1972, retired from Indiana University South Bend in 1986, and has been working on geometry ever since. (More elsewhere in this newsletter) **Ted Hatcher is elected Professor Emeritus on his retirement.** His e-mail address is hatcher49103@yahoo.com. He's been travelling quite a bit between Berrien Springs, Arizona, and Hawaii (poor little fellow). Don Rhoads takes over the chairmanship.

Joon Hyuk Kang joins our faculty, with a PhD from Michigan State in non-linear Partial Differential Equations. His wife, Yun Myung Oh, who also has a PhD from MSU (Differential Geometry) joins us as a contract teacher, and as part-time faculty the following year.

A Goals 2000 grant from the Benton Harbor School District provides funds for participation by three of our faculty (Lynelle Weldon, Ron Johnson, and Keith Calkins (ISD faculty)) in an **Alternative Math Endorsement program for Middle School Educators.** About 35 participants enroll. Larry Burton, (School of Education), Lynelle Weldon and Judy Wheeler (Berrien County Intermediate School District) were the prime movers for this project.

2001-02: Ken Franz retires and becomes Professor Emeritus. Ken served with distinction in the general education and remedial areas of our program since 1991. His current e-mail is franzk@andrews.edu.

A new 30 credit hour **"Mathematical Studies" major** is initiated to give a mathematics credential to students majoring in another field. The first "taker" (Erich Pannwitz, Physics) graduates in Spring 2002.

Shandelle Henson joins the faculty. Shandelle is an outstanding scholar who works in Mathematical Biology, and her presence brings a new level of research activity in the Department. In the midst of her move to Andrews, she has a paper accepted in the journal *Science*.

At the beginning of the year the Department had 19 majors, including 12 BS in mathematics, 5 math studies, and 2 BS in math education. At midpoint in the year, 10 of them have math GPA ≥ 3.80.

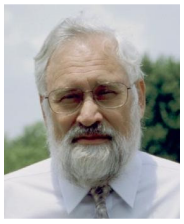
Our colloquium series has a total of 15 local and guest mathematicians as speakers, in addition to physics lectures.

Lynelle Weldon is appointed to the **Program Review Board of the Michigan Department of Education.**

For the first time, we have a **Spring section of Calculus I.** Taught by Shandelle Henson with an emphasis on Biological applications, it attracts 19 students. We plan a Calculus II section next Fall with the same emphasis.

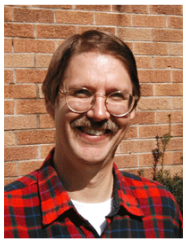
Meet the Mathematics Faculty, 2002

Since this is the first issue of this Newsletter, we thought it would be appropriate to let you get a look at our present faculty, and tell you a bit about their interests. We're happy to report that the old tradition of hanging together and supporting one another is still alive and well in the Andrews Mathematics Department.



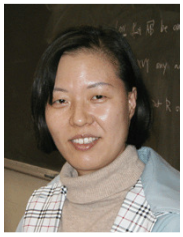
Don Rhoads, Chair. Don received his BA from Andrews, an MA from Rice, PhD from U. of Michigan, with a thesis in operator theory. He returns to the faculty after a long hiatus in which he ran a business and educated himself in other ways of the world. Besides doing paperwork, scheduling, and administrative chores for the Department, he likes to ride trains, grow native grasses and wildflowers, and raise Cain generally about environmental issues. He's also a serious consumer of classical music, attending live concerts whenever he can

Shandelle Henson received her BS from Southern Adventist U., her Masters from Duke, and PhD from the U. of Tennessee (Knoxville). A post-doc followed at the U. of Arizona, and most recently she taught at The College of William and Mary. She has interests in both pure and applied mathematics and has produced 25 papers (a recent one appeared in *Science*) mostly in the area of Dynamical Systems applied to biological populations. A serious outdoors person, she loves to run trails and finds proximity to Lake Michigan to be one of the best things about Andrews.



Ron Johnson is tied with Don as the senior member of the Department (both are in their eleventh year of teaching at Andrews). He received his BMus from Southern Adventist U., his MS and PhD from the U. of Texas (Arlington), in the field of Computational Differential Geometry. Ron is extraordinarily versatile as a teacher—he's taught just about everything in the curriculum. Lately he has taken an interest in Actuarial Science and mathematics of finance, becoming an informal liaison with the School of Business. He's also an accomplished trombonist and a serious cyclist.

Joon Hyuk Kang received his bachelor's degree from Sung Kyun Kwan U. in Korea, two Masters (one in Statistics) and a PhD from Michigan State U. He does research in non-linear Partial Differential Equations, and their applications to biological competition problems. He brings real strength to our applied mathematics offerings, has recently published two papers and has recently obtained new PDE results in collaboration with his wife, Yun Myung Oh, who works in Differential Geometry (see below).



Yun Myung Oh received her bachelor's and Masters from Ewha Women's U. in Korea, and her PhD from Michigan State University. She and her husband Joon have produced new results by applying her area of expertise (Differential Geometry) to his (PDE); in other collaborations they have produced a baby daughter Min Seo. Yun Myung recently had a paper published in the *Mathematical Transactions of the Cambridge Philosophical Society*. She does not make much noise, but she is known to have the most wicked chalkboard technique in the Department.

Lynelle Weldon received her BS from Pacific Union College, and her MA and PhD from the U. of California (Davis). Since she arrived on campus in 1997, she has led the charge through Calculus I and II, and this year is pioneering an entirely new way of teaching remedial mathematics, using the web system ALEKS. She recently published a paper in the *Journal of Pure and Applied Algebra*, and has become active in teacher education, serving this year on the Michigan State Department of Education Program Review Board.

The Specht geometry project

Since his retirement from Indiana University South Bend in 1986, Edward J. Specht (chair of the Andrews Mathematics Department from 1947-72) has been creating a uniquely rigorous exposition of Euclidean geometry. Filling five notebooks, this work uses modern set-theoretic language and builds heavily on the notion of a collineation (a transformation of the plane which preserves straight lines). Professor Specht has achieved several new results in this work.

Before his death in 1995, Harold Jones keyboarded much of the first part of the book, editing and supplying commentary as he went. We have copies of the typescript but it appears that the disk copy has been lost.

Edward J. Specht (October 2001)

The Specht Geometry Matching fund: The Department has set up a special fund called the "Specht Geometry Matching Fund" to receive donations for keyboarding and editing Dr. Specht's work. This is not to be confused with the Edward Specht Endowed Scholarship Fund, which provides several thousand dollars each year for student scholarships. The Geometry Fund is not an endowment fund—all contributions will be used to pay for the typing and editing.

A donor who wishes to remain anonymous has promised to match any contributions dollar for dollar. We estimate that we will need to pay an able person for at least a complete summer or perhaps half a year in order to complete the keyboarding, and we need to raise half this amount from donations.

We plan to use Scientific Word to keyboard the material in handwritten form, and re-keyboard the part already done, making it suitable for editing and publishing. Scientific Word is a front-end for Tex, the standard mathematics typesetting system. Not only is it WYSIWYG, but it permits easy construction of the special symbols used by Specht in his work.

If you are interested in contributing to this fund and thus have a part in advancing geometrical knowledge, you can send donations to the Department (checks should be made to Andrews University, fund code 211386).

You may wish to request a copy of the full summary that Dr. Specht has prepared . Just call the Department at 616 471 3423, or write to dhr@andrews.edu, and we'll send you a copy. We don't have it in html, so can't put it up on our website at this time.

The Specht Geometry Project: a brief summary:

Initially, only "incidence" axioms are assumed, which have to do with intersections of planes, lines, and points. Even assuming only a few very "lean" axioms, the resulting *incidence geometry* contains a surprising number of theorems. The next stage is to assume the strong form of the *parallel axiom*, which says that given a line L and a point O not on L, there exists a unique line M through O which is parallel to L. The geometry now available is called *affine geometry*. It is in this geometry that *collineations*—that is, transformations of the plane which preserve lines—come into play. Collineations naturally divide themselves into *translations*, *dilations*, and *axial affinities*, and various sets of collineations form groups under composition form groups, so that the full power of abstract group theory becomes available.

Next, the parallel axiom is temporarily suspended and four *betweenness* axioms are adjoined to the original incidence axioms, forming the *IB geometry*. In this geometry it is possible to define segments, rays, triangles, and convex sets and prove some of their properties. In IB geometry, many appealing theorems can be stated, but not proved. These become provable when just one more axiom is appended to the list: the *Plane Separation* axiom. This axiom states that when two points lie on opposite sides of a line L, the segment joining them intersects L. The resulting geometry is called *Pasch* geometry, after the geometer Moritz Pasch.

In Pasch Geometry, the inside and outside of an angle, the inside and outside of triangles quadrilaterals can be defined. Also, an order relation on a line can be defined, with the usual properties of transitivity and trichotomy, and it is natural to assume a further "least upper bound" axiom, which provides a notion of "continuity". A completely regular topology can be developed now for the Pasch plane.

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The Specht Geometry Project summary: continued

The next phase of development is the introduction of the concept of congruence of sets by means of the axial affinity mappings (reflections) which preserve betweenness. Four additional axioms are appended to the system, and the result is called *neutral geometry*, because no commitment is made regarding a parallel axiom. Isometries of the plane are now feasible to consider, segments can be ordered by length, and angles can be ordered. All these relations satisfy transitivity and trichotomy, and many useful theorems relating angles and edges of a triangle can be proved.

In the presence of neutral geometry, the weak form of the parallel axiom (Given a line L and a point Q not on L, there exists at most one line m through Q that is parallel to L) is equivalent to the strong form cited above. Adjoining the weak form of the parallel axiom to neutral geometry yields *Euclidean geometry without continuity*. A remarkably large part of Euclidean geometry can be developed without a notion of continuity, and a model can be built for rational numbers.

Once continuity is assumed, Euclidean geometry comes into its full flower. Real and irrational numbers can be defined and it is possible to coordinatize the Euclidean plane, providing the powerful tools of algebra to couch geometric relations in algebraic language.

The full text of Dr. Specht's summary is available on request from Department of Mathematics, Andrews University, Berrien Springs, MI 49104-0350, or from dhr@andrews.edu.

Problem corner:

The following problem was submitted by Prof. Ron Johnson, who found it in *Statistical Inference*, by Casella and Berger, 2nd edition (Duxbury).

The Exchange Paradox: A swami puts m dollars in one envelope and $2m$ dollars in another. You and your opponent each get one of the envelopes (at random). You open your envelope and find x dollars, and then the swami asks you if you want to trade envelopes. You reason that if you switch, you will get either $x/2$ or $2x$ dollars, each with probability 1/2. This makes the expected value of a switch equal to $(1/2)(x/2) + (1/2)(2x) = 5x/4$, which is greater than the x dollars that you hold in your hand. So you offer to trade.

The paradox is that your opponent has done the same calculation. How can the trade be advantageous for both of you?

If you figure it out, send the answer to Problems, Department of Mathematics, Andrews University, Berrien Springs, MI 49104-0350, or e-mail johnson@andrews.edu

On this and the next page, we'd like to acquaint you with three mathematics students: one has already graduated, one will graduate this May, and one has just started.

Our most recent graduate: Adrian Patrascu

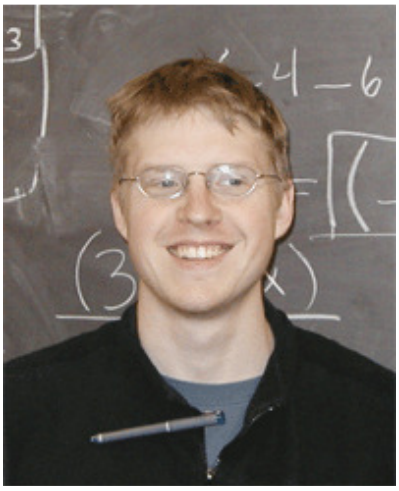
Andrews University doesn't have Winter commencements, but that hasn't prevented Adrian from receiving his degree. The reason he looks so happy is that he has it clutched in his hot little fist, just out of camera range (we did take some pictures that included it, but the shiny cover reflected too much light to make a good picture).

Adrian was born in Bucharest, Romania, and came to Andrews via LaSierra University, where he began his serious mathematical studies. His stay there created a firm friendship with Wilton Clarke, (BA math, 1965) who is a Professor of Mathematics at LaSierra.

His degree is in Mathematics with a minor in Business. That combination (and the fact he has already passed two Actuarial Society examinations) has gotten him an good position with Watson Wyatt Worldwide, a major consulting firm specializing in pensions and human resource management. Last summer, Adrian made a smart move by taking an internship with Watson Wyatt. He learned a lot about the business, and apparently Watson Wyatt liked what they saw.

We liked Adrian a lot as a student. He was industrious and got good grades, and had a good deal of "spirit" about him. Generally, he says, he had a "great experience" at Andrews. Now he's looking forward to getting married this summer, spending more time reading (a bit broader selection than he's been able to achieve while in college, we guess) and indulging his repressed passion for painting. Way to go, Adrian!

Our First Math Studies Major: Erich Pannwitz



Erich Pannwitz was born in West Berlin, but came to the US when he was eleven and regards Illinois as his home. His sister Helene is a freshman at Andrews this year, taking Animal Science. He'd eventually like to do graduate work in Physics, probably in the area of relativity and gravitation, but he'd like to take a bit of a breather after finishing his degree in May, "maybe dig ditches or something, for a while." He states that the Physics department treats its students very well, by providing good support, a place to study, and lots of individual contact with professors.

Erich has worked as a Physics lab assistant and from time to time as a mathematics tutor in the Math Center. Our Math Studies major was made for people exactly like Erich—people who need to take a lot of mathematics for their main line of study, and can be beguiled into taking a bit more to get a serious mathematics credential along with their first major. We wish for him excellent ditch-digging, or cosmological research, whichever it be.

Alumni Notes = ∅ In future issues of this newsletter, we want to include information about you. Drop us a letter or e-mail (dhr@andrews.edu will work fine); send a picture if you can. Let us know whether we can exchange this information with Focus, the official Alumni journal of Andrews University. If you have an address of a colleague who would like to receive this Newsletter, please let us know that, too.

A most promising Freshman: Kami Lizarraga

Kami Lizarraga comes to Andrews from Lynchburg, Virginia where she was home schooled by her mother, Sheryl Lizarraga, in the company of her two younger sisters, Laci and Niki.

She says her mom was strong in English and she got lots of grammar and reading, but didn't emphasize math all that much. Kami, it seems, essentially taught herself Algebra, Geometry, and Precalculus from the *Saxon* texts, and apparently did a good job because she successfully completed AP calculus at Shenandoah Valley Academy, where she attended for her senior year. She chose Andrews over two other competing schools, one of which was The College of William and Mary, because she wanted to be in an Adventist college with a good mathematics program.

When we first talked to her about coming to Andrews, she told us right up front that she "didn't want to be an Actuary". The first math course Kami took at Andrews was Discrete Math (300 level) and now she's taking Calculus II and doing just fine.

Talk to Kami about a "second major" and she gets a rather far away look in her eye and doesn't say much. She has enjoyed her computer programming classes, likes SAGES (Andrews' new honors program based on a "great books" idea) but you get the idea that *mathematics* is what she *really* loves. A budding "pure" mathematician? We need that kind for sure!

How you can help the Andrews University Math Dept:

It goes way beyond "sending money". Sure, we appreciate your financial support, but there are several other ways you can help us make the Andrews Mathematics Department a better place for the next generation of mathematicians. Here are some tangible contributions you can make:

1) Let us know your history since leaving Andrews. Our students need to see the great variety of professions in which our alumni have been successful. If you send us some information (and a picture, if possible) we'll print it in this newsletter and maybe you'll renew some old acquaintances. (Please let us know if it's ok to share your story with Focus, the Alumni magazine)

2) If you travel near Berrien Springs, think about giving a lecture. Our colloquium series "Math Conversations" includes not only technical mathematics topics, but a wide range of other topics of interest to our students.

3) Let us know how we can improve our program. We value the expertise you have acquired since you left Andrews, and we will appreciate your sharing your accumulated wisdom.

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