

The Faculty Scholar of Roanoke College

1988 REVIEW

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Motivational Mathematics

MOTIVATIONAL MATHEMATICS

Roland Minton has a rather curious way of combining things — mathematics and public relations; hard-line opinions and a caring nature; marriage and publishing; teaching and research.

This fourth-year assistant professor of mathematics and his chosen discipline are full of interesting surprises. Composed and soft-spoken, Minton is an aggressive and spirited PR agent for math. "It's very alive and there are controversies that can be fun. The level at which math anxiety is accepted gives our students an easy out," he argues.

This is the same man whose students quickly describe him as understanding, caring and even "absolutely wonderful."

While any basic-level student might contend math is full of problems and solutions, Minton insists his field is not that black and white — it's not simply about "computing numerical answers. There are opinions and approaches to be determined."

The cover of Minton's recently-published book, *Structured Hereditary Systems*, is, in fact, a graphic illustration of his assertion that math is not black and white. It features a prototype problem for a component of a future space station.

"On a robot arm, there are certain places (wrist, elbow, shoulder) which can move independently," explains Minton. "But a rotation at the shoulder will move the elbow and wrist, so to accomplish any task the individual parts must cooperate. The mathematician works with a set of equations describing the movement of the joints and their interactions. A typical problem would be to try to compute the most efficient way to move the arm from orientation A to orientation B."

One might think of it as a chess game: each piece, with its own purposes, can move in certain ways; with each move, there are determinations to be made which affect the course and outcome of the game.

Minton researched and authored *Structured Hereditary Systems* with his master's advisor, Robert E. Fennell, and his doctorate advisor James A. Reneke. The book (which Minton claims he couldn't have read more than ten pages of until after graduate school) reflects a total of 15 years of research and is targeted at Ph.D.

students and researchers. The three authors' work is an exploration of a new approach to analyzing certain mathematical systems. In these systems, the future depends on the past (hence the term "hereditary") as well as the present. For instance, the wrist of a robot arm may not sense the shoulder's movement immediately. The wrist would have to rely on its knowledge of the shoulder's past movements to determine an appropriate action. Hereditary systems provide a more accurate description of real world phenomena, but are not yet well understood mathematically.

Minton joined the Roanoke College faculty in 1986 after four years of teaching at a large state university. A native Virginian, he spent his undergraduate days at Virginia Commonwealth University and then pursued his mathematics studies at Clemson University where he earned his master's and doctorate degrees. Dedication to research is the common denominator through Minton's years as student and then teacher: research intern for the Social Security Administration as an undergraduate; R. C. Edwards research fellow at Clemson; author or co-author of seven research publications and one book between 1984 and 1988; and presenter of research studies at numerous conferences and symposia since 1982.

Currently, Minton is working on a solutions manual and student study guide for a calculus book with his wife, Jan, who is on leave from Virginia Tech; this year, she is teaching math at Roanoke as well. The husband-and-wife team of mathematics teacher-scholars expects the manuals to be published in 1992. But chances are the

professional collaboration won't end there. Next, Minton and Minton expect to embark on a textbook project on the subject of a hand-held calculator, slightly more powerful than a Commodore 64. Completely in his element, Minton grins as he remarks, "It may sound unique now, but not for long!"

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Minton says both he and Jan are very interested in teaching, calculus, and numerical analysis. "We enjoy using our computer skills to solve problems and we enjoy working and researching together." The two met during their first semester at Clemson when they teamed up on a term project: "I liked theory and she liked programming, but neither of us knew that; we both thought we had really stuck the other one!" Two and a half years later, they were married and have since added two children, Kelly and Greg, to the sum.

"Continual crisis management" is Minton's solution to balancing priorities in his life and the percentage of time each one gets from him. He is quick to point out that all those things important to him — teaching, research, and family — are quite time-consuming. And that list does not even include Minton's role as campus "bookie."

The seemingly quiet and calm faculty



Assistant Professor of Mathematics Roland B. Minton

Andres Alonso

member, who describes himself as "the typical absent-minded professor when I'm thinking about research," has found yet another way to integrate his interests and talents. Minton is Roanoke's underground football/basketball pool coordinator. He's a sports nut.

In what might be considered a more professional application of these interests, Minton developed and teaches the college's first interdisciplinary sports course: Sports Science, a scientific perspective in sports. He found several books with good ideas about the relationships between sports, physics, math and statistics which led him to pursue and complete the proposal for the new course.

"We examine simple things to start," he notes. "For example, a golf ball has X number of 'dimples'; physics explains why that helps it fly . . . We explore statistical analysis as a good way of deciding the most valuable player or the best (game) strategy in a particular situation. This is a nice way to interest students in some of these disciplines."

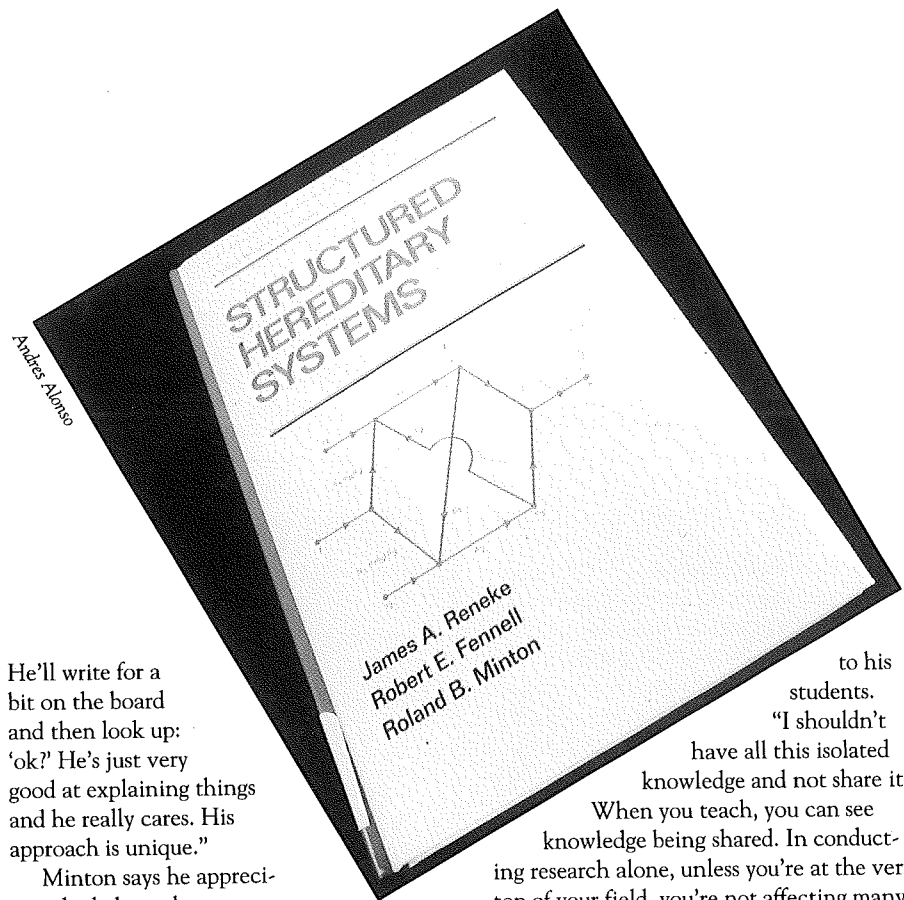
That's one of the ways Minton promotes math to students. "We need to do more PR work in the mathematics field." Minton believes his value as a teacher is in passing on viewpoints, "because math is not necessarily neutral."

He also enjoys working with high-level

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math students and exposing them to mathematical research. Steve Garren '89, who received the Mathematics, Computer Science, and Physics Department's 1989 Julia McBriety Chalfant Memorial Award, reviewed a survey article on fractals under Minton's supervision. "For Steve, as an undergraduate in math, that was real research." It won the Guy Eckman Award for outstanding independent study in fall 1988.

Senior math major Molly Pickard, who just completed a summer internship with NASA, smiles as she describes Minton's ability to work with all levels of students. "He always wants to be sure we understand one point before he moves on to the next.



He'll write for a bit on the board and then look up: 'ok?' He's just very good at explaining things and he really cares. His approach is unique."

Minton says he appreciates the balance between teaching and researching at Roanoke. He maintains that his research gives him perspective on basic skills to use and not use and he enjoys passing those on

to his students. "I shouldn't have all this isolated knowledge and not share it. When you teach, you can see knowledge being shared. In conducting research alone, unless you're at the very top of your field, you're not affecting many people; in teaching, you are. For me, research provides a nice way to combine investigations and input into national curriculum development."

