MICHAEL RANDY GABEL

CURRENT POSITION

Associate Professor of Mathematics and Integrative Studies
New Century College
College of Humanities and Social Sciences
George Mason University
Fairfax, Virginia 22030
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EDUCATION

B. S. in Mathematics	Massachusetts Institute of Technology	1965
M. A. in Mathematics	Brandeis University	1968
Ph. D. in Mathematics	Brandeis University	1972

PROFESSIONAL EXPERIENCE

Graduate Teaching Assistant	Brandeis University	1966-1971
Instructor	Purdue University	Fall 1971
Assistant Professor of Mathematics	Purdue University	Sp 1972-1978
Assistant Professor of Mathematics	George Mason University	1978-1981
Associate Professor of Mathematics	George Mason University	1982-present
Associate Professor - New Century College	GMU	2000-present

Acting Assistant Dean, CAS	George Mason University	Fall 1986
Acting Associate Dean, CAS	George Mason University	Sp 1987-April 1988
Senior Associate Dean, CAS	George Mason University	April 1988-Sept 1990
American Council on Education Fellow		Aug 1989-June 1990
Co-Director, GMU Instructional Development Office		July 1991-Dec 1997

TEACHING-RELATED GRANTS AND HONORS

1. Danforth College Project Fund Grant (with E. Joyce) ($1000) (1979)
   CBMS-NSF Grant (with Richard Draper) to hold a regional conference in mathematics (Spring, Summer 1979)
2. Hewlett-Packard Corporation Equipment Grant ($13,500) (1983)
   Center for Information Technology, Boeing Computer Services and the National Science Foundation Grant: Supercomputer Applications (with Steven Seidman and Frederick Siff GMU) ($150,000) (1985-1986)
3. American Council on Education Fellow: Center for Leadership Development; Placement: University of Maryland Baltimore County (1989-1990)
4. "Funds for Excellence" Virginia State Council of Higher Education Grant: “Infusing Technology into Teaching, Learning, and Community” ($115,000, 1994-96)
5. Recipient: GMU Teaching Excellence Award, Fall 2002
6. Recipient: GMU David J. King Faculty Teaching Award, Fall 2002

RESEARCH PUBLICATIONS

1. Generic orthogonal stably free projectives, J. Algebra 29, No. 3 (1974), 477-488.
2. Stably free projectives over commutative rings. Trans. Amer. Math. Soc., tentatively accepted if revised.
3. (with A. V. Geramita) Stable range for matrices. J. Pure and Appl. Alg. 5 (1974), 97-112. This paper also appeared in the Report of the Algebra Group, Queen's Papers in Pure and Applied Mathematics, No. 41, 1974.
4. Lower Bounds on the stable range of polynomial rings. Pacific J. Math. 61, No. 1 (1975), 117-120.
5. Algebraic vector fields on the 2-sphere. J. Pure and Appl. Algebra, 11 (1977) 29-40.
6. Generation and projective generation of ideals. J. Algebra 76, No. 1 (1982), 186-191.
7. (with S. Zoltek) Decomposability preserving curvature operators with an application to Einstein manifolds. Proc. AMS 90, No. 2 (1984) 303-308.
8. (with Stephen B. Seidman) Supercomputing Technology: A State-of-the-Art Introduction and Assessment. Proceedings of the Invitational Forum: The Supercomputing Decision for Cost-Effective Scientific Computation, CIT and GMU, 1986.
9. (with Stephen B. Seidman) Proceedings of the Invitational Forum: The Supercomputing Decision for Cost-Effective Scientific Computation, CIT and GMU, editor, 1986.

TEACHING PRESENTATIONS/ACTIVITIES: On-Campus

1. Six-week seminar on stably free projectives (Purdue, Fall 1972).
2. Four-week seminar on the relation between the Serre Conjecture and the complete intersection problem (Purdue, Fall 1973).
3. Two lectures in the Faculty History of Mathematics Seminar (Purdue University, Spring 1973).
4. Graduate problem seminar (Purdue University, Fall 1975).
5. Four lectures on algebraic curves which are complete intersections (GMU, Fall 1978).
6. Two lectures on Gaussian Quadrature in the Applied Mathematics Seminar (Summer 1979).

7. Five lectures in the Algebra Seminar on the Hilbert-Samuel Polynomial (Spring 1980).
8. Six 3-hour lectures on the nature of truth in mathematics in the Doctor of Arts in Education Seminar (1980-1987).
9. Departmental colloquium on the cutting out of curves by surfaces (Fall 1980).
10. Two lectures in the (Mathematics) Computer Graphics Seminar and wrote several programs to illustrate concepts (Fall 1982).
11. Lecture to the Alpha Chi Honor Society on Computers and Privacy (March 27, 1983).
12. Two lectures in the Summer Seminar for PAGE (Plan for Alternative Education) on the mathematics of tennis and the nature of statistical sampling (Summer 1983).
13. Lectures on "The Mathematics of Tennis," "The Nature of Statistical Sampling," "Problem Solving: The Balance Problem," "Problem Solving in the Humanities (with Jan Cohn)," "Modeling: The Circus Stilt Walkers," and "The Firefighter's Net Problem," for the PAGE summer faculty (1983-1985).
14. Lectures on "The Nature of Truth in the Natural and Mathematical Sciences," "The Nature of Truth in Mathematics," "The Fundamental Mathematical Models," and "Errors in Mathematical Modeling" in the PAGE strand lectures (1983-1985).
15. Four lectures in the Lie Algebra seminar (Fall 1984).
16. Three lectures in the Coding Theory Seminar (Fall 1985).
17. Lectures to the PAGE 120 class, applications of spreadsheets (two lectures in 1992 and two in 1993).
18. 1996 GMU Faculty Orientation: “Using Electronic/Interactive Classrooms” and in the Plenary Session, “Integrating Technology and Teaching” (August 22, 1996).
19. Ways of Knowing class in the DAED: “Ways of Knowing Mathematics” in Evelyn Jacob’s Ways of Knowing course (April 4, 1997, and two other unremembered times).
20. Parents Day at NCC: “Problem Solving in NCC” (July 15, 1997).
21. 1997 GMU Faculty Orientation on Technology and Information Management and Learning at Mason, Plenary Session #5 (August, 21,1997).
22. Executive Briefing to President, the VP's and the Deans on Technology Resources to Support Teaching (Oct 17, 1997).
23. Exponential Growth Models: 'Mathematics and Biology' for the Mathematics Awareness Month (April 24, 1999).
24. Applications of Excel to Statistical Analysis: A Laboratory Exercise, for Unit 1 of NCC (Fall 2000, Fall 2001).

TEACHING PRESENTATIONS/ACTIVITIES - Off Campus

1. Virginia's Governors School: teacher (Summer 1981).
2. Applications of algebra. Fairfax County Mathematics Teachers In-service Training (July 25, 1983).
3. Paradoxes in mathematics. South Lakes High School Math Club (December 21, 1983).
4. Thinking and Problem Solving, Westchester State University (1986).
5. The Paint Paradox. Robert Frost Junior High School (April 1987).
6. Supercomputing Technology: A State-of-the-Art Introduction and Assessment, The Supercomputing Decision for Cost-Effective Scientific Computation (May 15, 1986).

7. The Benefits of Being Confused, to an Honors Mathematics class at the University of Maryland, Baltimore Campus (Fall 1989).
8. Presenter at Thomas Jefferson High School for Science and Technology (1990, 1993, 1998).
9. EDUCOM 94 (invited by Macromedia Corporation): “Applications of Authorware to Teaching” San Antonio (November 1994).
10. State Council of Higher Education: Forum on Faculty Development : “So how did you learn that? Faculty development and information technology.” Richmond (with John O'Connor) (Fall 1994).
11. Cause 95: “The Faculty Development Perspective” New Orleans (with John O'Connor, Walt Sevon, and Charlene Hurt) (November 1995).
12. American Association for Higher Education 1995 National Conference on Higher Education: Workshop on Technology and Teaching (March 19, 1995).
13. Ed-Media 96 Education Multimedia and Hypermedia & World Conference on Educational Telecommunications, sponsored by the Association for the Advancement of Computing in Education: “Institutional Faculty Development in Education Technologies to Improve Classroom Teaching: Launching the IDO Pioneers and Guides" Boston (with Ronnie Feeg) (June 1996).
14. EDUCOM 96: "Friendly Persuasions: Strategies Promoting Collaborative Computing" Philadelphia (with John O'Connor, Walt Sevon, and Charlene Hurt) (October 1996).
15. Virginia Assessment Group: "Using a Year-Long Integrated Research Project with Freshman to Engage NCC Competencies (with Jim Fletcher, Karen Oates, John O'Connor, Sondra Patrick, Edwin Powell, and Joe Wood) (November 15, 1996).
16. American Council On Education Planning Session for Annual Meeting on International Uses of Technology for Teaching, Washington, D.C. (January 14, 1997).
17. Infobits 97: “Applications of Technology to Teaching” Arlington, VA (April 25, 1997).
18. "How Technology Enhances Teaching," Old Town Hall, Fairfax (October 22, 1997).
19. “BioMathematics.” Thomas Jefferson High School, Fairfax, VA (March 15, 1998)
20. Faculty Advisor: "NCLC 295, A Chesapeake Bay Learning Community: Natural History of the Chesapeake, the Living Bay's Hidden Secrets," Summer Experiential Learning Community (Summer 1998).
21. Biology/Mathematics/Communications Wrapped in Technology: An Exposition of the Fourth Iteration of the Natural World Learning Community-An Integrative Scheme that Works (with Luther Brown) University of Tampa (March 12, 1999).
22. "Repeating Decimals," GW Community School, Annandale, VA (January 24, 2001).
23. “How Mathematics is Discovered,” Robinson High School, Fairfax, VA (October 25, 2005)
24. “How Paradoxes Promote Learning,: Tall Oaks Retirement Home, Reston, VA (December 10, 2006)
25. "How Paradoxes Promote Learning, Osher Lifelong Learning Institute, April 15, 2008
26. The Mathematics of Climate Modeling, The Smithsonian/Mason Program, February 27, 2008.

TEACHING PRESENTATIONS/ACTIVITIES - *FAR* Off Campus

1. "How Paradoxes Help You Learn" (three classes) (plus, a German class). A Muslim school in Central Lombok, Indonesia (Fall 1997).
2. "Strategies for Learning." A Buddhist high school in Phuket Town, Thailand (Fall 2000).
3. "Solving Puzzles." A village elementary school inside of Taman Negara National Park, Peninsular Malaysia (Fall 2000).
4. "Problem Solving." High School in Pangkalanbun, Central Kalimantan (Borneo), Indonesia (Fall 1999).
5. "A Village-based Mathematics Project." local village teachers, Tanjung Puting Reserve, Central Kalimantan, Indonesia (Fall 1999).
6. "Rope Tricks and Problems Solving." a Masai village in the Serengeti, Tanzania, Africa (Spring 2000).
7. "Helping Students to Learn by Confusing Them." Chiang Mai University, Chiang Mai, Thailand (Fall 2001).

INVITED RESEARCH ADDRESSES, PRESENTATION AND LECTURES

1. Lower bounds on the stable range of polynomial rings. Regional Conference in Algebra, University of Nebraska, June 26, 1974.
2. Projective modules and stable range. George Mason, University, Fairfax, Virginia, February 27, 1976.
3. Boratynski's results on complete intersections. Hochster's proof of Quillen's theorem on local-global generation of modules over polynomial rings. The Nagata Conference at Northern Illinois University, July 26, 1977.
4. Generation and projective generation of ideals. Special Session in Commutative Algebra, American Mathematical Society Meeting at the University of Wisconsin-Parkside, November 1, 1980.
5. Some results on the number of generators of ideals. Conference in Algebra, Virginia Commonwealth University, November, 1982.
6. Supercomputing Technology: A State-of-the-Art Introduction and Assessment. Invitational Forum: The Supercomputing Decision for Cost-Effective Scientific Computation, May 15, 1986.

COMPUTER/TECHNOLOGY TEACHING-RELATED PROJECTS

1. Produced computer assisted video film on the dependence upon coefficients on the graph of rational functions, using a CDC 6400/6500 and an IMAC graphics terminal (Purdue Fall 1974).
2. Wrote mathematical text formatter for NEC 7720 Spinwriter in the Spellbinder macro language M-speak (Summer 1983).
3. Wrote mouse interfaced graphical analysis program for the analysis of iterations maps of the plane to itself (Spring 1986).
4. Wrote: *Strategizer: A Teacher of Problem Solving*, written in Authorware Professional for Windows (1996-7).

SELECTED UNIVERSITY/COLLEGE TEACHING-RELATED COMMITTEES AND PROJECTS

Faculty Senate (1979-1980, 1981-1986).
Academic Policies Subcommittee (1981-1982). Secretary (1982-1983, 1984).

Organization and Operations Subcommittee (1983-1986).
College of Arts and Sciences Academic Planning and Policies Committee (1982-1985).
Chair: Subcommittee on Innovative Liberal Education (1979-1981).
Academic Computing Advisory Committee to the Vice President
Long Range Planning (member 1978-1983, chair 1982-1983).
Chair of full committee (1983-1986).
Library Budget Self-Study Committee Chair (1980).
PAGE Executive Committee (member 1982-1986).
Course leader of design team for the PAGE course on
The Analysis and Solution of Quantitative Problems (1983-1987).
Wrote Assessment report to the State of Virginia on the
Undergraduate Computer Science Program at GMU (Fall 1982).
Member, Mainframe selection committee (1981) and Faculty Computation
Research Laboratory selection committee (1984).
Member, Search Committee for the Robinson Professorships (1984-1985).
Member, Computer Budget Conference Subcommittee (1986).
Chair, University Faculty Standing Committee on Effective Teaching (Spring 1985 - 1987).
Organizer, Showcase for Technology in Innovative Teaching (Spring 1991).
Co-Chair, Presidential Project Team on Learning Initiatives (Fall 1990 - 1993).
Member, Presidential Project Team on University Life (Fall 1991 - 1993).
Organizer, Showcase for Technology in Innovative Teaching (Spring 1991, 1993, 1996).
Co-Chair, subcommittee on technology issues for the University Center (Sp 1993 - Fall 1997).
Member: Institute of the Arts, Core Faculty
CAS Council
Chair, New Century College Faculty (2006)

SELECTED DEPARTMENTAL TEACHING-RELATED COMMITTEES/PROJECTS

1. Sat on three (mathematics) Ph. D. defense committees (Purdue 1973, 1975).
2. Wrote and graded Algebra qualifying exam (Purdue 1974).
3. Assistant Director of CBMS-NSF Regional Conference in Mathematics (Summer 1979).
4. Departmental Library Liaison (budget = $25,000) (1979-1984).
5. Computer Science Advisory Committee (1981).
6. Computer Equipment Evaluation Committee (1981-1986).
7. Member, Department Graduate Committee (Fall 1984-1986).
8. Member, Department Undergraduate Committee (1985)
9. NCC Council
10. NCC Curriculum Committee
11. NCC General Education Committee
12. NCC Faculty Chair
13. NCC IT Committee

CIVIC AND COMMUNITY TEACHING-RELATED ACTIVITIES

1. Scoutmaster: Cambridge, Massachusetts (1964-65).
2. Lafayette Audubon Society: Conservation Committee Chair. Lafayette, Indiana (1975-1978).

3. Wildcat Creek Conservation Committee: Member and Organizer (twice) of the nature component of Wildcat Creek Appreciation Day. Lafayette, Indiana (1976-1978).
4. Regional Science Fair Judge: Purdue University (1974-77).
5. Local Science Fair Judge: Thomas Jefferson High School (April 18, 1998).
6. State Science Fair Mathematics Judge: Head Judge (1985-88, 1993, 1995).

COURSES TAUGHT (with selected comments)

PURDUE UNIVERSITY

UNDERGRADUATE COURSES

Euclidean Geometry
This was a junior level course for prospective high school mathematics teachers.

Honors Single Variable Calculus
This was a great class. It met 5 days a week and had very good students in it. They knew their algebra! This was the first course in which I tried to have students do some of the teaching. They did not lecture, but, instead, I set up a rather formal process by which the students helped each other with homework. They would meet, in class, at the board, simultaneously, in pairs; one would ask the other a question, they'd take notes on the exchange, and then they would switch roles. The notes on their interchanges would be turned in to me for comments. The best thing that happened was that, sometimes, the process broke down and they ended up animatedly discussing the material.

Single Variable Calculus
Honors Multivariable Calculus
Multivariable Calculus
300 students. Two overhead projectors. A microphone. Fun the first week.

Ordinary Differential Equations
Honors Linear Algebra
Linear Algebra
Introduction to Probability
Honors Abstract Algebra
Abstract Algebra
Honors Real Analysis
Undergraduate Topics Seminar
In this course, the students did virtually all the talking. I'd help them choose a topic, they'd meet with me for a trial run, and then they would present to the class. Each member of the class kept notes, which they copied over and handed in to me for a grade. This was a very special experience for these students.

GRADUATE COURSES

Rings and Modules
Problem Seminar
This course mimicked the undergraduate topics seminar in spirit and construction, except that the topics were more problem oriented than topic orientated.

READING COURSES

The courses below were all individually taught courses, above, of course, my normal load.

Set Theory (Fall 1971)
Group Theory (Fall 1972)
Abstract Algebra (Fall 1972)
Rings and Modules (Spring 1973)
Differential Equations (Spring 1975)

Infinite Abelian Groups (Fall 1976)

GEORGE MASON UNIVERSITY

UNDERGRADUATE COURSES

Finite Mathematics

Concepts in Mathematics

This is a difficult course to teach. It is the typical "math for poets" course. Students often felt the content was unimportant and thus uninteresting. My development of the PAGE courses, The Analysis and Solution of Quantitative Problems, I, II, was a direct response to the issues I observed with this course.

Mathematics of Management

300 students. This was the calculus gateway to the Business School. It was team taught with Ron Levy. We threw out bubble gum to get questions from the class. It worked.

Mathematics and Culture (in NCC)

Team taught with Daniele Struppa, this general education course developed the relationships between mathematics and culture from ancient times through Newton and was taught about half the time by the students in the course.

Community of Learners (Unit 1 of NCC)

The Natural World (Unit 2 of NCC)

The Nature of Mathematics

Mostly student taught with focus on mathematical proofs. Students were mostly elementary education majors.

Conservation Biology (In NCC)

Honors Mathematics - Second Semester

Calculus (three semester sequence)

The first semester version of this is very special for me. It's a chance to show the power and grandeur of mathematics. It is the classic "transition" course for the students. Many come out of this course changed.

Differential Equations

This can be a terrible course, with much memorization of tricks. I tried to provide some interesting applications.

Analysis I

This is another transformational course, but for more advanced undergraduate mathematics students. It starts nearly from ground zero and develops calculus, done right this time.

Foundations of Mathematics

This is another "transformation" course. Students move from thinking that mathematics is all memorization and problems to understanding its structure. They come to understand that they, themselves, can provide an argument (a proof) and be convinced of something because they, themselves, believe it and not because the "professor" told them.

Abstract Algebra

For many of our majors, this is the most sophisticated and abstract class they will take. Well taught, it can be an eye opener.

Linear Algebra

Mathematics for the Elementary School

Most members of the department shun this course. It's not so hard to understand this feeling. The course is taken by prospective elementary teachers who are often math-phobic. The material is deceptively simple. The problem is that foundational material is first learned by being "brainwashed" when one is young. This is a time when reasons are not given, just techniques. These prospective teachers must move from wanting to know "how" to wanting to know "why." That is not a easy task.

Discrete Structures in Mathematics

Computer Science I
Introduction to Statistics
Analysis and Solution of Quantitative Problems I,II
This course is described in the section on PAGE
Algebraic Coding Theory
This course was particularly interesting to me and to the students, for it applied abstract linear algebra to the problem of transmitting distortion-free data. For most of these students, this was their first theoretical applied mathematics course.

GRADUATE COURSES

Intermediate Algebra
Intermediate Analysis
This course, and the one above, had two sort of incompatible audiences: prospective (weak) graduate students in mathematics and high school teachers needing graduate credit in mathematics. What was true was that this was an extremely important course for each of these groups. This was clearly understood by the prospective graduate students. The high school teachers, though, often did not want to be in the class, for many of them knew they were not quite understanding what they were teaching and did not want to confront that. This was an extremely satisfying course to teach for, generally, the graduate students became prepared and the high school teachers gained both knowledge and confidence.
Abstract Algebra
Algebraic Coding Theory

READING COURSES

Dedekind Rings (Fall 1979)
The student I worked with on this reading course was by far the best student I had ever come across, ever. He was actually in high school, taking my Abstract Algebra class, when I recognized his talents. He surely taught me as much as I taught him. He eventually received a Ph. D. in mathematics at Princeton.
Galois Theory (Spring 1980)
This was taught to the student discussed above.
Homological Algebra (Spring 1983)
General Ring Theory (Fall 1983)