The Maryland - District of Columbia - Virginia Section of The Mathematical Association of America

Fall Meeting
Friday November 13 and Saturday November 14, 1987
Northern Virgina Community College
Alexandria, Virginia

Friday November 13, 1987

Advanced registration is required for both the Minicourse and the Banquet.

MINICOURSE

3:00 - 6:00	Minicourse: Differential Equations Software
Room 117	Howard Penn and Jim Buchanan, USNA
Bisdorf Building	

Advanced registration required.

The study centers on MS DOS compatible machines and software designed to enhance differential equations. Some of the software can be copied; as a corollary, participants should bring three formatted disks to the Minicourse

BANQUET AND SPEAKER

6:30 - 7:30 Cash Bar
7:30 P.M. Banquet
Ramada Inn, Seminary Road
Alexandria, Virginia

INVITED ADDRESS

"Links and New Ideas"
Dr. Bernard L. Madison
University of Arkansas and National Academy
of Sciences, Washington, DC

Saturday November 14, 1987

ALL TALKS AND MEETINGS WILL BE HELD IN THE TYLER BUILDING ON THE ALEXANDRIA CAMPUS OF NORTHERN VIRGINIA COMMUNITY COLLEGE

8:00 - 11:00	REGISTRATION
12:30 - 1:00	
Lobby: Tyler Building	

8:30 - 11:000	Coffee and donuts available
Lobby: Tyler Building	

8:40	"WELCOMING REMARKS"
128-129 Tyler	Dr. Jean Netherton, Provost
	Northern Virginia Community College.

SESSION BEGINNING AT 9:00 A M

11 Tyler   "Minimum Dimension for Matrices of Order n"
                            J. R. Hanson, James Madison University.

12 Tyler   "On the Road with Maryland's Lean and Lively
                        Nukes"
                            Richard Leo Eisenman, Rand Corporation & UMUC
                            and Linda Mint, University of Maryland
                            University College.

13 Tyler   "A Fast Route to Spectral Decomposition and Matrix
                        Canonical Forms Starting with the Cauchy Integral"
                            Jack Clark, Western Maryland College.

15 Tyler   Mathematics Accountability or Legislative Reform"
                            John T. Taylor, Division of Mathematics,
                            Science and Computer Science, Hillsborough
                            Community College, Tampa, Florida

SESSION BEGINNING AT 9:30 A M

11 Tyler   "How Many Angles"
                            Clifford J. Maloney, Bethesda, MD.

12 Tyler   "New Uniform Asymptotic Series for Legendre
                        Functions on the Cut"
                            Alexander S. Elder, U. S. Army Ballistic
                            Research Laboratory, Aberdeen Proving Ground.

13 Tyler   "A History of Topics in First Semester Calculus"
                            Thomas Sonnabend, Montgomery College.

15 Tyler   "The Electronic Journal"
                            James P. Coughlin, Towson State University.

SESSION BEGINNING AT 10:00 A M

11 Tyler   "Dominant Stroke Analysis: Relief from the
                        Numbers"
                            Dr. G. Edgar Parker, James Madison University

12 Tyler   "How Asymptotic Expansions of a Function $f(z)$ Can
                        Lead to More Accurate Approximations Than the
                        Convergent Series That Defines $f(z)$"
                            William D. Reddy, US Army Ballistic Research
                            Laboratory, Aberdeen Proving Ground.

13 Tyler   "Calculus via Music, Humor, Viedo, Food, and Other
(50 min)   Morsels"
                            Andrew A. Bulleri, Howard Community College.

᠋ Tyler   "An Easy Method for Proving Some Hard Binomial
(50 min)   Identies"
                            Lou Shapiro, Howard University.

SESSION BEGINNING AT 10:30 A M

11 Tyler   "A Historical Approach to Calculus"
                            Victor J. Katz, University of the District of
                            Columbia.

12 Tyler   "Calculus, Discrete Mathematics and Signal
                        Processing"
                            John Schmeelk, Virginia Commonwealth
                            University.

13 Tyler   Continuation of presentation in progress.

15 Tyler   Continuation of presentation in progress.

11:00 A M   MAA BUSINESS MEETING - 128-129 Tyler Building

12:00 Noon - 12:45   LUNCH

128-129 Tyler   INVITED ADDRESS 1:00 - 2:00 P M

                        "Calculus with Algebraic, Numerical, and Grapical
                        Computing"
                            Paul Zorn, St. Olaf College and Purdue
                            University.

SESSION BEGINNING AT 2:00 P M

11 Tyler   "Pupils, Pedagogs, and Problem Solving: Results
                        from Recent Research Projects"
                            Dr. V. M. Camerlengo, The George Washington
                            University.

128 Tyler   "Sofya Kovalevsky, Woman of Mathematics"
                            Marcelle Bessman, Frostburg State College.

12 Tyler   "Computer Software for Calculus Instruction"
                            Jonathan Wilkin, Northern Virginia Community
                            College

13 Tyler   "How to Inspire Differential Calculus through the
                        Use of Discrete Dynamical Systems"
                            James Sandefur, Georgetown University.

15 Tyler   "Getting into Abstract Algebra: Quotient Groups
                        and Other Related Topics"
                            Eddie Boyd, Jr., University of Maryland
                            Eastern Shore.

SPECIAL SESSION   2:30 P. M.
128-129 Tyler   "The NSF Initiative in Calculus and Other
                        Educational Programs"
                            Dr. Louise Raphael, Program Director,
                            National Science Foundation

BERNARD L. MADISON

Dr. Madison is a native of Kentucky. He was educated in his native State at Western Kentucky University and at the University of Kentucky. He has been a University faculty member since 1966. His experience includes 13 years at Louisiana State University and eight years at the University of Arkansas where he is currently Professor and Chairman of the Department of Mathematics. He has also served as Acting Dean of the Fulbright College of Arts and Sciences, University of Arkansas. He is Project Director of National Assessment of Mathematical Sciences, National Research Council. His life has been filled with scholarly pursuits, with service to the mathematics community, and with achievement. He divides his time among teaching, research, administration, and his family who reside in Fayetteville.

PAUL ZORN

Dr. Zorn was born in India, and had his primary and secondary schooling there. He did his undergraduate work at Washington University in St. Louis, and his graduate work at the University of Washington, Seattle. His dissertation area is several complex variables. Since 1981 he has taught at St. Olaf College, Northfield, Minnesota. His special interests, beyond complex analysis, include mathematical expository writing and using computers to strengthen mathematical teaching and learning. He is spending the current academic year on sabbatical leave from St. Olaf College at Purdue University.

LOUISE A. RAPHAEL

Dr. Raphael is a program director in the Division of Mathematical Sciences of the National Science Foundation. Her responsibilities include the Calculus, Instrumentation and Faculty Enhancement programs for mathematics. Last academic year, she was a program officer in NSF's Science and Engineering Education Directorate. She holds the rank Professor of Mathematics at Howard University. Her research areas include differential equations and splines. She has served as acting administrative officer of CBMS. She presently serves on the Visiting Lecturer Committee of the Mathematical Association of America. She is the Chair of the MAA's Task Force on Minorities in Mathematics.

EXTRACTS FROM ABSTRACTS OF PAPERS

Hanson - An algorithm for the construction of rational matrices of a given order and minimum dimension will be demonstrated. Much use of the minimum polynomial of a given matrix is made.

Eisenman & Mint - Nontraditional adult education using four methods of learning: Lectures via onsite visits, experiments via MicroCalc, Plato Learning Modules via modems, exams via Fax.

Clark - The title given captures the topic admirably.

Taylor - A review of Florida legislation since 1979 with impact on the mathematics curriculum. He will review the legislation, discuss the impact of these laws and provide copies of the legislation and related material.

Maloney - Motivated by Hilbert's treatment of plane and hyperbolic geometry, an arguement is made that it is only necessary to assume that one pair of remote angles congruence is given by the axiom. The paper employs both a logical argument and a counter-example and points out the significance for geometry of Hilbert's 1899 effort.

Elder - Formulas are obtained by comparing the Mehler integrals for the Legendre functions with Poisson integrals for Bessel functions. New expansions with explicit coefficients are under consideration. (See the paper by Reddy which follows this one.)

Sonnabend - Not clear about how to relate it (History of Calculus) to the sequence of topics in a first course---Sonnabend claims to have been in this position but he did something about it.

Coughlin - ...the printed journal to be replaced ...thousands of articles via a word processing system ... Periodical purging will be found a more effective way of eliminating useless articles than the current system of refereeing which it replaces.

Parker - ...tennis scoring via a probability model. In this analysis, the impact of a big shot, e. g. serve, is studied. Factors that make this "big shot" model desirable for classroom use are highlighted.

Reddy - Under certain conditions, the series for the associated Legendre functions converge very slowly. ... Asymptotic expansions requiring fewer terms can be used with backward recursion to attain excellent approxima- tions. (See the paper by Elder which preceeds this one.)

Bulleri - An hour presentation in which poetry, music, cranberry sauce, cakes, beer, medicine, etc, are used to motivate calculus students.

Shapiro - Binomial identities are written in terms of triangular matrices. Generating functions are defined on the columns giving quick, comprehensible proofs for some difficult identities.

Katz - Aspects of the history of calculus are useful. Some can be incor- porated into the curriculum. Examples abound: basic formulas for integrating and differentiating by Fermat, power series by Newton, differential equations by Euler.

Schmeelk - Students oftentimes guard their thinking when they encounter discrete problems. The transition from traditional calculus to a discrete setting can be accomplished by implementing a special generalized function. Results of a project involving processing discrete data will be given.

Camerlengo - Results of two federally funded training and research projects will be discussed. TRIPS (Teacher Retraining through Instruction in Problem Solving) and PREPS (Pre-Engineering Preparation of Secondary School Students) are reviewed.

Bessman - The mathematical achievements of Kovalevsky are contrasted to the familial and societal pressures and contraints within which they occurred and against which she labored.

Wilkin - Demonstration of software used as a part of his lectures in calculus classes at Northern Virginia Community College.

Sandefur - Derivatives can be used to study the stability of an equilibrium value for simple nonlinear difference equations. Graphing techniques including concavity are used to study stability. When $f'(E) = -1$, the chain rule and product rule are important. Applications are taken from a harvesting model.

Boyd - ... Most students give up trying to understand quotient groups long before reaching the fundamental homomorphism theorem. A natural framework for the discussion of quotient group is set in place. Then 'different' examples of groups, rings, and other concepts can be genereated in a beginning course.