

**Northeastern Section of the MAA
UNIVERSITY OF NEW HAMPSHIRE, DURHAM
50TH ANNIVERSARY MEETING OF NEW/MAA
Northeastern Section NExT Program**

Friday, November 18, 2005

12:00 - 1:00 p.m.

Lunch and Group Discussion

1:00 - 1:30 p.m.

Abstract Algebra: Teaching and Grading Proof

Karen Stanish, Keene State College

1:30- 2:00 p.m.

Teaching the Big Picture in Calculus

Jason Moliterno, Sacred Heart University

NES/MAA 50th Meeting

Friday, November 18, 2005

1:00 – 6:00 p.m.

Registration

1:00 – 3:00 p.m.

Executive Committee Meeting

3:00 – 3:50 p.m.

Connections Between Mathematics and Biology

Carl Cowen, Indiana University Purdue University at Indianapolis

4:00 – 4:50 p.m.

The Mathematical Preparation of Teachers: History,

Issues, and Challenges

Karen Graham, University of New Hampshire

5:00 – 6:00 p.m.

Undergraduate Student Papers

6:00 – 8:00 p.m.

Dinner and Opening Remarks

8:00 – 8:50 p.m.

Primal Screens

Carl Pomerance, Dartmouth College

Saturday, November 19, 2005

8:00 – Noon

Registration

8:00 – 9:00 a. m.

New Colleagues Presentations

8:00 – 9:00 a. m.

Contributed Paper Session

9:00 – 9:50 a. m.

Graduate Student Paper Session

9:50 – 10:20 a. m.

Graduate Reception

9:50 – 10:20 a.m.

Break

10:20 – 11:20 am

Christie Lecture: Title to be announced

Dusa McDuff, SUNY at Stony Brook

11:30 a. m. – 12:20 p. m.

Distinguished Teaching Award Lecture: Take Me Out

To The Simplex

Dave Abrahamson, Rhode Island College

12:20 – 12:40 p. m.

Business Meeting

12:30– 1:30 p. m.

Lunch

1:40 – 2:30 p. m.

Title to be announced

Ron Graham, University of California at San Diego

2:40 – 3:30 p. m.

Submodular Percolation

Peter Winkler, Dartmouth College

Title: Connections Between Mathematics and Biology

Speaker: Carl Cowen, Indiana University - Purdue University at Indianapolis (IUPUI)

Abstract: In this talk, Dr. Cowen will outline some of the research areas in the emerging collaborations between mathematical and biological scientists. In addition, Dr. Cowen, who began his study of the mathematics of neuroscience in 2002-03 at the Mathematical Biosciences Institute at Ohio State University and who worked in 2003-04 as a junior post-doc in the lab of Prof. Christie Sahley in the Purdue University Biology Department, will illustrate the connection between mathematics and neuroscience with a discussion of the Pulfrich phenomenon, an experiment that helps illuminate how the brain processes visual images. There are few mathematical or biological prerequisites for this discussion.

Biography: Carl Cowen was born and raised mostly in Indiana. He was educated at Hanover College, Indiana University, and the University of Warwick (England), and received his PhD in pure mathematics from the University of California, Berkeley. He was at Purdue University from 1978 to 2004, but before

that he had a post-doc position at the University of Illinois and had teaching experience in junior high school and small colleges. He was Director of Purdue's Actuarial Science Program from 1992 to 1997 and was Head of Purdue's Mathematics Department from 1997 to 2002. Since August 2004, he has been Dean of the School of Science at IUPUI (Indiana University - Purdue University at Indianapolis) where he has had the chance to promote research and education at this rapidly developing young institution. In addition to his academic work, he has been involved in the governance of each of the three major mathematical organizations, and he is currently serving as President of the Mathematical Association of America.

For many years, his primary research interests have been in operator theory and complex analysis, specifically, studying operators on a space of analytic functions given by composition with fixed functions. His primary pedagogical interests have been in teaching linear algebra, both to math majors and to engineering students. He has directed about 25 undergraduate students in research mostly on topics in linear algebra, and he has supervised several PhD students.

In 2002-03, he spent a sabbatical year at the Mathematical Biosciences Institute at The Ohio State University where he began changing his research attention to the mathematics of neuroscience. In 2003-04, he worked with biologists at Purdue to develop a mathematical model of parts of the sensory system of the medicinal leech and also to develop and teach a course on computational neuroscience for senior math and biology majors.

Title :The Mathematical Preparation of Teachers: History, Issues, and Challenges

Speaker: Karen J. Graham, University of New Hampshire

Abstract: The mathematical preparation of teachers continues to be an integral part of undergraduate programs at a majority of mathematics departments in US colleges and universities. The broader mathematics community has a long history of support for strong mathematics content preparation for prospective teachers. However, issues remain about what mathematics teachers at various levels should know and how they should come to know it. This talk will present a brief history of the preparation of mathematics teachers in the US, an overview of current issues and research in the area of mathematics teacher preparation, and challenges that we face.

Biography: Dr. Karen J. Graham is Professor of Mathematics in the Department of Mathematics and Statistics and Director of the Joan and James Leitzel Center for Mathematics, Science, and Engineering Education at the University of New Hampshire (UNH). She received her Ph.D. in Mathematics Education from UNH in 1986. She taught mathematics in Pine Plains NY prior to beginning work on her doctorate and taught at Western Michigan University, Kalamazoo, MI prior to joining the faculty at UNH in 1987. Dr. Graham also directs the UNH Master of Science for Teacher (MST) in Mathematics program. Her professional and scholarly interests include the teaching and learning of calculus, mathematics education reform based research, and mathematics teacher development. Dr. Graham has served as the project director of many state and federally funded projects. She has presented numerous workshops at local, state, regional, and national conferences. She has served on several national and regional committees/professional boards and as president of the NH Association of Teachers of Mathematics and the Association of Teachers of Mathematics in New England. In addition she has served as a documentation consultant on several national research projects designed to explore mathematics education reform efforts, the QUASAR (Quantitative Understanding: Amplifying Student Achievement and Reasoning) Project, the R3M (Recognizing and Recording Reform in Mathematics Education) Project, and the CCH Evaluation and Documentation Project. In 1999, Dr. Graham received the Richard H. Balomenos Mathematics Education Service Award from the NH Association of Teachers of Mathematics.

Title: Primal Screens

Speaker: Carl Pomerance, Dartmouth College

Abstract: Prime numbers, the very building blocks of the integers, remain an enigma. Yet we make progress, sometimes with the energetic aid of undergrads. This non-stressful talk will highlight recent progress and some of the many unsolved problems still on our plates.

Biography: Carl Pomerance received his B.A. from Brown University in 1966 and his Ph.D. from Harvard University in 1972 under the direction of John Tate. Currently he is a mathematics professor at Dartmouth College, after previous positions at the University of Georgia and Bell Labs. A number theorist, Pomerance specializes in analytic, combinatorial, and computational number theory, with applications in the field of

cryptology. He considers the late Paul Erdos as his greatest influence.

Title: *Symplectic Topology Today*

Speaker: Dusa McDuff, SUNY at Stony Brook

Abstract: The past twenty five years has seen striking advances in our understanding of symplectic topology. This subject studies the topological and geometric structures underlying Hamilton's formulation of classical mechanics. The structures in question are global, and it took many years to find tools with which to see them. In the 1980s several different strands of inquiry came together, crystallizing in foundational theorems about the nature of symplectic space and the canonical transformations that preserve its structure. The tools initially came from variational calculus and differential geometry but, fed by ideas from physics, have now been extensively developed, leading to new insights about global Hamiltonian systems as well as the structure of 3 and 4 dimensional manifolds. This talk will describe some of the main results and techniques, and aims to give a idea of where the subject stands now.

Biography: Dusa McDuff grew up in Scotland. She obtained her Ph. D. from the University of Cambridge, U.K., in 1971. After lectureships at the universities of York and Warwick, she came to Stony Brook in 1978, where she is now a

Distinguished Professor. She is a Fellow of the Royal Society (London) and a member of the National Academy of Sciences. For the past twenty years she has worked in the area of symplectic topology.

Title: Take Me Out To The Simplex

Speaker : Dave Abrahamson, Rhode Island College

Abstract: Over the last few decades, a growing number of questions in the world of baseball have drawn the attention of mathematical modelers. We will survey some of the results, including the "Pythagorean prediction" of a team's record, the relative importance of various offensive statistics, and a recent use of linear programming to study the outcomes of the annual Cy Young Award voting.

Biography: Dave Abrahamson received his B.S. in Mathematics from Harvey Mudd College and his Sc.M. and Ph.D. in Applied Mathematics from Brown University. Carlton Fisk's Game 6 homer made him late with a real analysis assignment, and he later had to proofread his dissertation during Fernandomania. He is celebrating his twentieth year at Rhode Island College, during which time the Red Sox have won the World Series once.

Speaker: Ron Graham, University of California, San Diego (UCSD)

Title: Packing Discs in the Plane

Abstract: A classical problem in geometry deals with finding the densest packings of equal discs in the Euclidean plane. While the solution to this problem has been known for more than a hundred years (hexagonal is best), there are many variations of this problem which are completely unsolved. In this talk, I will describe some of what is currently known and what is still unknown.

Biography: Ron Graham is one of the world's best-known mathematicians and computer theorists. He pioneered worst-case analysis in scheduling theory, online algorithms, quasi-randomness, and Ramsey Theory. He holds the Irwin and Joan Jacobs Endowed Chair in Computer and Information Science at the University of California at San Diego (UCSD), and is Chief Scientist of the California Institute for Telecommunications and Information Technology. He joined the UCSD faculty in 1999, after a 37-year career with AT&T. He received his Ph.D. in mathematics from the University of California at Berkeley in 1962. From 1962-1995, he was director of information sciences at AT&T Bell Labs, and from 1996-99 Chief Scientist of AT&T Labs. In 2003, Graham won the American Mathematical Society's annual Steele Prize for Lifetime Achievement. The citation noted that he "has been one of the principal architects of the rapid development worldwide of discrete mathematics in recent years. ... [and] his talks and his writings have done much to shape the positive public image of mathematical research in the USA, as well as to inspire young people to enter the subject."

Dr. Graham is in the Guinness Book of World Records for using (in 1977) the largest number ever in a mathematical proof, now known as "Graham's number." He is the Treasurer of the National Academy of Sciences, a Fellow of the American Academy of Arts and Sciences, a fellow of the American Association for the Advancement of Science, a past President of the AMS, and Past President of the MAA. He is a highly skilled juggler and trampolinist, and is a past president of the International Jugglers Association. In addition to the Steele Prize, he has won numerous awards in the field of mathematics, including the Polya Prize in Combinatorics from SIAM, the Euler Medal from the Institute of Combinatorics and Its

Applications, the Lester R. Ford Award from the MAA, and the Carl Allendoerfer Award from the MAA.

Title: Submodular Percolation

Speaker: Peter Winkler, Dartmouth College

Abstract: Suppose you need to upgrade a computer system, one component at a time. Is it possible that you may have to downgrade a component at some point, in order to keep things running smoothly? More generally, when can a process be designed so as to avoid making backward steps? We examine the case where the process can be modeled as a path through a (modular) lattice, and the object is to avoid large values of some submodular function. In this case it turns out that there is always a chain, i.e. a path with no backward moves, which is as good as any path. Moreover, this chain beats any path in a novel order on real sequences which we call the "worm order". Joint work (from last spring at MSRI) with Graham Brightwell (LSE), now continuing with Lizz Moseman (Dartmouth).

Biography: Peter Winkler is Professor of Mathematics and Computer Science, and Albert Bradley Third Century Professor in the Sciences, at Dartmouth. His research lies primarily in combinatorics, probability and the theory of computing; he also collects puzzles, both mathematical and mechanical, and is the author of "*Mathematical Puzzles: A Connoisseur's Collection*" (AK Peters, 2004). In some circles, Prof. Winkler is best known as the inventor of cryptologic techniques for the game of bridge, which have now been declared illegal for tournament play in most of the Western world.

Hotel Information

We have room blocks available in several area hotels, with special conference discounts. Generally, hotels expect conference bookings to be paid one month before the event, hence mid October, 2005. Be sure to mention the MAA meeting when calling any of the hotels listed below. Hotels in Durham are generally within walking distance from campus (most are very close, the Pines requires a long walk). Hotels in or near Portsmouth are within easy driving distance from campus (20 minutes).

Hotels in or near Durham, NH:

The Hotel New Hampshire A new hotel which just opened in August, 2005. The name is derived from a John Irving novel of the same name. Located at 2 Main St., next to Durham's historic district and within walking distance of campus. About 68 rooms are included in the conference block (43 doubles, 23 queens and 2 suites), with a price of \$89/night. 2 Main Street Durham, New Hampshire 03824 (603) 868-1234

The New England Center a hotel and restaurant located on a private wooded setting on the UNH campus, at 15 Strafford Rd. About 59 rooms are blocked, with a price of \$99/night.

The Pines Guest House A guest house on a large estate within walking distance to UNH, at 47 Dover Rd. About 3-4 rooms are available for \$69-\$99.

Three Chimneys Inn A newly restored 1649 Mansion and Carriage house, situated on a hill overlooking gardens, the Oyster River, and the Old Mill Falls; close to campus. The room rate is \$179/night. 17 Newmarket Road, Durham, NH 03824 Phone: 603.868.7800. 1.888.399.9777, Fax: 603.868.2964

Hotels in or near Portsmouth, NH:

Anchorage Inns About 40 rooms are available for \$69.96 plus tax. About 10 miles from UNH. 417 Woodbury Avenue, Portsmouth, NH 03801 - 603-431-8111.

Hampton Inn About 60 rooms are available at \$89/night plus tax (use "MAA" to get the lower rate), including breakfast buffet and evening reception with complimentary snacks. About 10 miles from UNH. 99 Durgin Lane Portsmouth, New Hampshire 03801 (603) 431-6111, (800)-HAMPTON, Fax: (603) 431-6222.

Courtyard by Marriott About 40 rooms are available at \$109/night (use code "MAA"). About 12 miles from UNH. 1000 Market Street Portsmouth, New Hampshire 03801 1-603-436-2121 Fax: 1-603-430-

7666.

Best Western Wynwood Hotel and Suites 40 rooms are available at \$79.95/night. Just off Interstate 95 at EXIT 5 in Portsmouth. (603) 436-7600

Meals

There will be two meals that will be part of the regular meeting, a Dinner Banquet on Friday evening and a Lunch on Saturday. You must pre-register (see above) to be guaranteed reservations for these meals. Your pre-registration, including meal reservations, must be received by Thursday, November 10. Spouses and guests are welcome at meals but must be included in the pre-registration count. Both meals will be buffet-style with some vegetarian and vegan options. However, we have asked for any special meal needs, e.g., vegetarian, vegan, just to be sure that we have adequate quantities.

The Banquet will be on Friday night, November 18th, 6:00-8:00pm, in Huddleston Hall. There will be three hot buffet entree choices, including a vegetarian dish. See the full [menu](#). The cost of the banquet is \$27.00 per person.

The cost for the buffet lunch on Saturday will be \$8.00 per person. The Lunch will be held in Holloway Commons.

The Section NEXt Lunch on Friday is open only to Section NEXt participants.

Parking

The University of New Hampshire has strict parking regulations. Unless other arrangements are made, visitors should park in the Visitors Lot adjacent to the Visitor Information Center. Check the web site <http://www.southernct.edu/organizations/nesmaa/fall2005meetinglocalarrangements.html> closer to the meeting for more information on parking.

Directions

From Boston, Massachusetts

Take I-95 North to Exit 4 (N.H. Lakes and Mountains, Spaulding Turnpike). Continue North to Exit 6W and follow Route 4 West. Exit at Route 155A and turn east toward Durham. Follow 155A through a short stretch of fields. Take a left onto Loop Road, bearing right and driving a short distance until you reach the UNH Visitor Center, a small white clapboard building on your left. Metered parking is available at the lot adjacent to the **Visitor Center**. You may purchase an all day parking pass in the Visitor Center. For more information about parking at UNH, visit **UNH Transportation Services** online.

From Portland, Maine

Follow I-95 South to Exit 5. Continue on Spaulding Turnpike North to Exit 6W and follow Route 4 West. Follow directions as listed from Boston. (Driving time, approx. 60 minutes)

From Concord, New Hampshire

Take Route 4 East to the 155A exit. Follow directions as listed from Boston. (Driving time, approx. 45 minutes)

From Manchester, New Hampshire

Take Route 101 to Epping. Go north on Route 125 to the Lee Traffic Circle. Travel east on Route 4 to the Route 155A exit. Follow directions as listed from Boston. (Driving time, approx. 45 minutes)

By Airplane

Boston's Logan International Airport is approximately 60 miles from Durham. **C & J Trailways** offers bus service between Boston and Seacoast, N.H. The Manchester Airport is approximately 40 miles from Durham. (Bus service is not available from Manchester to Durham.)

By Bus

C&J Trailways has bus routes to the Seacoast area from Logan Airport and to Durham from South Station in Boston. For schedules and fares, call (603) 742-5111 from N.H, 1-800-258-7111 from outside N.H., or visit their Web site: www.cjtrailways.com.

By Train

Amtrak Downeaster service provides four round-trips daily between Boston (North Station) and Portland, Maine. The Downeaster service stops directly at the UNH campus Friday through Sunday. Monday through Thursday, the train stops at the Dover, N.H. station, which is connected directly to UNH by Wildcat Transit Route 3. The Dover station is only five miles from the UNH campus — a short taxi ride away for immediate access. For more information on train schedules, please consult www.thedowneaster.com. You may also call Amtrak at 1-800-USA-RAIL. Visit [UNH Transportation Services](#) for connecting Wildcat Transit service to the Dover station.

By Shuttle

Mermaid Transportation offers daily shuttle service between the Durham campus and Manchester and Logan airports. For schedules and fares, call 1-800-696-2463, or visit their Web site: www.gomermaid.com.

Pre-Registration

Please Pre-register! On-line registration is NOT available. Please send the registration form on the next page so that it arrives by Thursday, November 10, 2005. Checks should be made to: *NES/MAA*. If you have questions about registration, you can also contact Eric Grinberg at grinberg@unh.edu. You should mail this pre-registration form to :

MAA Registration c/o Jan Jankowski
Department of Mathematics & Statistics
G21 Nesmith Hall
University of New Hampshire
Durham, NH 03824

REGISTRATION FORM

Last Name _____
 First Name _____ MI _____
 If you prefer another name on badge please indicate here: _____
 Institutional Affiliation _____
 Mailing Address _____

City _____ State _____
 ZIP _____ Country _____ Daytime Phone Number _____
 FAX Number _____

Email Address _____ Please check box that applies to you:
 Four-year college faculty Two-year college faculty
 University faculty High School teacher Retired
 Business/industry/government Undergraduate
 Unemployed (but not retired) Graduate student Student

Pre-registration fee: MAA Member <input type="checkbox"/> \$25.00 Non-Member <input type="checkbox"/> \$30.00 Student or unemployed <input type="checkbox"/> \$10.00	\$
Friday Banquet: \$27.00 per person (Be sure to include any guests.) Number: _____ Please indicate special meal needs/allergies: _____	\$
Saturday Luncheon: \$8.00 per person (Be sure to include any guests.) Number: _____ Please indicate special meal needs/allergies: _____	\$
TOTAL PAYMENT (Checks should be made payable to: NES/MAA.)	\$
Section NEXT: There is no fee for Section NEXt activities for Fall 2005. Are you attending Section NeXT on Friday? () Yes () No Are you attending the Section NeXT lunch on Friday? () Yes () No	