

DEPARTMENT OF MATHEMATICS
Annual Report to the Board of Trustees of
Rose-Hulman Institute of Technology
1 June 04 - 31 May 05

1. Department Overview
2. Personnel Changes
3. Student and Alumni Highlights
4. Faculty and Staff Activities
 - a. Teaching, Curriculum Development, and Student Advising
 - b. Professional Development and Student Project Mentoring
 - c. Professional Service
 - d. Faculty Honors and Awards
 - e. Membership in Faculty Clusters
5. Grants and Continuing Grant Activities
6. Departmental Programs

1. Department Overview

This was a very successful year for the department. In addition to very successful teaching, professional development and service programs on the part of the faculty. Here are some high points:

- a. Successful at hiring a tenure track faculty member in analysis, replacing Jerry Muir
- b. Revision of statistics program into Statistics and Operations Research
- c. 40% or more of incoming freshman have advanced math placements, allowing them to get AP credit for one or more calculus classes. Fast Track Calculus is over 10% of the freshman class. The math schedule accommodates all these students starting at different places in the curriculum, allowing students to take full advantage of their advanced placements.
- d. There is significant interest in mathematics courses beyond calculus, differential equations and basic statistics. Approximately 30% of students are taking these “beyond the foundation” courses. Enrollments in mathematics have been growing at about 2.5% over the last few years.

2. Personnel Changes

Hiring

- *Virginia Naibo* – tenure track appointment from the University of Kansas
- *William (Bill) Butske* – visiting appointment from Purdue University

Promotions

- Promoted to Full Professor: *Kurt Bryan*

Sabbaticals

- *Jeffery Leader* has arranged a sabbatical at Sandia National Labs for next year.
- *Yosi Shibberu* will be on sabbatical at the Washington University Medical School.

3. Student and Alumni Highlights

Pi Mu Epsilon Honorary Mathematics Fraternity: Twenty-seven new members of the Rose-Hulman student body were inducted at the spring 2005 Initiation Banquet for the Indiana Gamma Chapter of Pi Mu Epsilon. The speaker was *Dr. Herbert Bailey*, retired Rose-Hulman Department of Mathematics professor.

Mathematics Competitions

- **16th annual Alfred R. Schmidt Freshman Mathematics Competition** (advisors John Rickert and Allen Broughton) Fourteen freshmen took part in the Sixteenth Annual ARS Competition. First place prizes were awarded to *Piotr Pelcer*, and *Peter "Adam" Outcalt*, 2nd place prizes were awarded to *Jennifer Weber* and *Christopher Valenta*, and 3rd place prizes were awarded to *Chris Ebsch* and *Sara Zenner*.
- **26th Annual Virginia Tech Regional Mathematics Competition** (advisor Allen Broughton) Eleven Rose-Hulman students participated in this nation-wide mathematics problem solving competition held November 2004. *Dean Fehlau* placed 11th and *Adam Outcalt* placed 22nd.
- **65th Annual Putnam Competition** (advisor Kurt Bryan) In the 65th Annual William Lowell Putnam Mathematical Competition student *Guy Srinivasan* and *Kellan Wampler* ranked 287th out of 3,733 contestants
- **21st Mathematical Contest in Modeling** (advisor David Rader) Two teams from Rose-Hulman spent four days in February competing in this annual international modeling contest. Both teams received Honorable Mention, placing them in the top 35% of all teams. One team consisted of *Curtis Katinas* and *Peter Fine*; the other team was *Eric Borzello*, *Matt Ellis* and *Guy Srinivasan*.
- **40th Indiana College Mathematics Competition** (advisor Kurt & Allen Broughton)) The three Rose-Hulman teams placed 2nd, 3rd, and 6th out of 42 Indiana college teams at the 2005 ICMC held at IUPUI at Ft. Wayne in April 2005. Students *Stephen Dupal*, *Guy Srinivasan*, *Kellan Wampler*, *Peter Fine*, *Curtis Katinas*, *Angela Smiley*, *Dean Fehlau*, *Adam Outcalt*, *Hari Ravindran*.

Student Presentations

22'nd Annual Conference on Undergraduate Mathematics

- *Jennifer Guerard* presented “Modeling the Photochemical Transformation of Dissolved Organic Matter from an Antarctic Lake”
- *Justin Droba* presented “Orthogonality in the Conjugate Gradient Method”
- *Peter Fine* presented “The Properties of the Graph of Zero Divisors of \mathbb{Z}/pqr , where pqr are distinct primes”.

Student Awards

Freshmen Awards *Adam Outcalt* received the Theodore Paine Palmer Award for demonstrating excellence in mathematics during the freshman year.

Putnam Recognition *Guy Srinivasan, E. Kellan Wampler* for scoring in the Top 500.

Indiana Mathematics Competition Awards *Adam Outcalt, Sara Zenner, Peter Fine, Curtis Katinas, Angela Smiley, Guy Srinivasan, E. Kellan Wampler, Stephen DuPal, Hari Ravindran, Dean Fehlau.* All students showed strong performance in two or more regional mathematics competitions, including the Alfred R. Schmidt Freshman Mathematics Contest and the ICMC, Virginia Tech, and Tri-State competitions.

4. Faculty and Staff Activities

4.a Teaching, Curriculum Development and Student Advising

Enrollments Data for the last three years:

<i>Year</i>	<i>2004-05</i>	<i>2003-04</i>	<i>2002-03</i>
<i>Calculus/DE/Stats</i>	2398	2390	2220
<i>Post Calculus/DE/Stats</i>	961	912	912
<i>Total</i>	3359	3200	3132

Programs The Statistics concentration was modified into Statistics and Operations Research concentration.

Curriculum development groups The faculty is organized into four self selected interest groups according to the four concentrations of the degree program. The groups are:

- Traditional mathematics concentration –convener Josh Holden
- Discrete applied mathematics – convener Tom Langley
- Continuous applied mathematics – convener David Finn
- Statistics – convener David Rader

New courses and continuing course development

- Reliability - Diane Evans
- Topics in Actuarial Science – David Finn
- Topics in Tensors, Mechanics and Symmetry – David Finn
- Topics in Discrete Mathematics course on p-adic numbers – Josh Holden
- continued work on MA323 Geometric Modeling per NSF-CCLI Grant – David Finn
- continued work on Hidden Markov Models – Yosi Shibberu
- continued work on Parallel Computation – Allen Broughton
- MA487 – substantial revision – Mark Inlow

Student Advising and Support

- Freshman and Math major advisors: Kurt Bryan, Elton Graves, Roger Lautzenheiser, Tom Langley, Jeff Leader, Yosi Shibberu, Jeffery Leader
- Statistics and Actuarial advisors: Diane Evans, Mark Inlow, Jeff Leader
- Double majors and minors: Allen Broughton
- Pi Mu Epsilon Advisor: Elton Graves
- Math contests: See section 3 above
- RHIT Drumline Advisor: Diane Evans
- RHIT Macintosh Interest Group: Joshua Holden
- RHIT Martial Arts Club Advisor: Jeffery Leader
- RHIT National Society of Black Engineers Advisor: Yosi Shibberu
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4.b Professional Development and Student Project Mentoring

Publications, Articles, and Writing

Allen Broughton

- with Dan Jelski and Lazslo Nemes, “Energy Surface Derived from Vibrational Self-Consistent Field Calculations”, appeared in *Journal of Cluster Science*, April 2005.

Kurt Bryan

- with Lester Caudill at the University of Richmond, “Reconstruction of an Unknown Boundary Portion from Cauchy Data for the Heat Equation in N Dimensions” was accepted and appeared in the journal *Inverse Problems* in February 2005.
- with REU 2002 students Melissa Vellela and Ron Ogborne, “Reconstruction of Cracks with Unknown Transmission Condition” accepted and appeared in the journal *Inverse Problems*, February 2005.

- Paper “Imaging of Multiple Linear Cracks Using Impedance Data”, co-authored with summer 2003 REU students Nic Trainor (RHIT student) and Rachel Krieger has been submitted to the *Journal of Computational and Applied Mathematics*
- with Tanya Leise, “The \$20,000,000,000 Eigenvector” details the linear algebra behind Google’s PageRank algorithm and has been submitted to the Education section of *SIAM Review*.

Stephan Carlson

- “A Catchy Name for a Great 21st Century Idea: SIGMAA Benefits Really Add Up,” published in *FOCUS* (newsletter of the Mathematical Association of America), Vol. 25, No. 3, March 2005.
- “A Century Celebration: Former MAA President G. Baley Price Turns 100,” published in *FOCUS* (newsletter of MAA), Vol. 25, No. 5, May 2005.

Diane Evans

- “Algorithms for Computing Distribution for Discrete Random Variables”, co-authored with L. Leemis, published December 2004 issue of *Mathematical and Computer Modeling*.
- “The Distribution of Order Statistics for Discrete Random Variables with Applications of Bootstrapping”, co-authored with L. Leemis and J. Drew, accepted in *INFORMS Journal on Computing*.
- with J. Drew and L. Leemis, “The Distribution of the Kolmogorov-Smirnov Statistic for Exponential Populations with Estimated Parameters”, submitted August 2004.

G. Elton Graves

- paper “The Impact of Calculus Reform as seen by Engineering Seniors”, published *ASEE* in June 2004.
- “The Usefulness of Mathematics” accepted by *ASEE*.

Ralph Grimaldi

- “Ternary Strings that Avoid the Substring ‘21’”, *Congressus Numerantium*, December 2004.
- Paper “Ternary Strings with No Consecutive 1’s” submitted to *Ars Combinatoria*.

Joshua Holden

- “A Comparison of Cryptograph Courses”, *Cryptologia*, 28 (2), 2004.
- “Some Heuristics and Results for Small Cycles of the Discrete Logarithm”, co-authored with Pieter Moree, accepted *Mathematics of Computation*.
- “Distribution of the Error in Estimated Numbers of Fixed Points of the Discrete Logarithm”, accepted by *Communications in Computer Algebra*.
- with Richard Layton, Tina Hudson and Laurence D. Merkle “Underwater Model Rockets: An Innovative Design Problem and Competition for Undergraduate Students in Engineering, Math and Science”, to appear in *Proceedings of the 2005 American Society for Engineering Education Annual Conference and Exposition*.

Thomas Langley

- “Alternate transition matrices for Brenti’s q-symmetric functions and a class of (q,t) symmetric functions on the hyperoctahedral group” accepted by *Discrete Mathematics*.
- “Enumeration of m-tuples of permutations and a new class of power bases for the space of symmetric functions”, co-authored with J. Remmell, accepted by *Advances in Applied Math*.

Jeffery Leader

- his textbook, *Numerical Analysis and Scientific Computation*, recently went to a corrected 2nd printing of the 1st edition (Addison-Wesley).

Kenneth McMurdy

- with Robert Coleman, “Stable Reduction of $X_0(p^3)$ ”, submitted April 2005.

Brian Martensen

- “Generalized balanced pair algorithm”, *Topology Process* 28 (2004), no. 1
- with C. Holton, “Embedding tiling spaces in surfaces”, submitted for publication.

David Rader

- with Michael Seifert, William A. Kline, and Thomas W. Mason, “Automated Supply Chain Management in the U.S. Steel Industry”, *Proceedings of the 2004 National Conference of the American Society of Engineering Management*, October 20-23, 2004, Alexandria, VA, pp 443-452.
- with Concetta A. DePaolo, “A heuristic algorithm for a chance constrained stochastic program”, submitted to *European Journal of Operational Research*.

Presentations

Allen Broughton

- “Enumeration of the Equisymmetric Strata of the Moduli Space of Surfaces of Low Genus”, Santa Barbara, CA (2005 Spring AMS Western Section Meeting)

Kurt Bryan

- presentation on Rose-Hulman’s REU program at the MathFest conference in Providence, RI August 2004.
- “Undergraduate Mathematics Research at Rose-Hulman” at the MAA/AMS Joint Meetings in Atlanta, January 2005.
- “Fast Imaging of Multiple Cracks in a Homogeneous Conductor”, Invited talk at the January 2005 Joint Meetings regarding the summer 2003 and 2004 REU research.

Diane Evans

- “Using APPL (“A Probability Programming Language”) in a Post-Calculus Introductory Statistics Course” at the Joint Statistical Meeting in Toronto, Canada in August 2004.

David Finn

- “Geometric Modeling: An Applied Geometry Course” at MAA Mathfest in Providence, RI, and at the INMAA Spring Meeting at IPFW.

Elton Graves

- “The Impact of Calculus Reform as seen by Engineering Seniors” at the ASEE National Meeting, June 2004.
- “Putting it all Together” at MAA National Meeting in January 2005.

Ralph Grimaldi

- Two seminars on his research presented at ISU during the 04-05 school year dealing with the Fibonacci Numbers.
- “Ternary Strings with No Consecutive 1’s” at the National Meetings in January 2005.
- “Binary Strings and the Jacobstahl Numbers” at the Southeast Conference on Combinatorics, Graph Theory and Computing, Florida Atlantic University, March 2005.

Joshua Holden

- “The Graph Theory of Blackwork Embroidery” at the Mathematics and Statistics Conference on Mathematics and Symmetry at Miami University in October 2004, AMS Special Sessions at the Joint Meetings in January 2005, and the INMAA in April 2005.
- “Picking up Stitches” at the AMS Special Session on Mathematics and Mathematics Education in Fiber Arts at the Joint Mathematics Meeting in January.

Mark Inlow

- “Teaching the Different Interpretations of Probability” was presented at the INMAA meeting in April 2005.

Thomas Langley

- “Big cwatssets and Hamming codes” presented at the AMS/MAA Joint Meetings in January 2005.

Kenneth McMurdy

- “Explicit Generators for Endomorphism Rings of Supersingular Elliptic Curves” presented at the Number theory Conference in Honor of Harold Stark at the University of Minnesota in August 2004.
- “Stable Reduction of $X_0(p^3)$ ”. presented as invited speaker at the U.C. Berkeley Number Theory Seminar in October 2004.

- “Stable Reduction of $X_0(p^3)$ ”, invited speaker AMS Joint Meetings in January 2005.
- “Stable Reduction of $X_0(p^3)$ ”, conference on Automorphic Forms, University of North Texas.
- Above presentation was presented as a 2 part series at the Purdue University Algebraic Geometry Seminar in January 2005 and at the Indiana University Algebra Seminar in February.

Brian Martensen

- “Codimension one embeddings of tiling spaces” at Aperiodic Order: Dynamical Systems, Combinatorics, and Operators, Banff International Research Station. Banff, BC, Canada, June 2004.

David Rader

- “Using technology to enhance the teaching of OP and IP algorithms” at the October INFORMS national meeting. Denver, CO.

Yosi Shibberu

- “The Fundamental Theorem of Mathematical Modeling” at the ASEE Annual Conference in Salt Lake City, June 2004.
- “Contact Geometry of Protein Folds” at Washington University Center for Computational Biology and Biophysics in February 2005.

Rose Math Seminar

Allen Broughton

- “Equivalence of Real Elliptic Curves – Linear Equivalence”
- “Equivalence of Real Elliptic Curves – Birational Equivalence”

Kurt Bryan

- “Fast Reconstruction of Cracks using Impedance Imaging”
- “The \$20,000,000,000 Eigenvector” (2 part series)

Mark Inlow

- “Objective and Subjective Interpretations of Probability and the Corresponding Inference Paradigms”

Ken McMurdy

- “Why Number Theorists Care about Elliptic Curves” (2 part series)

Conferences and Workshops attended

Allen Broughton, Kurt Bryan, Stephan Carlson, David Finn, Elton Graves, Thomas Langley and David Rader: attended the Fall Indiana MAA Meeting held in Evansville in November 2004.

Allen Broughton, Kurt Bryan, Stephan Carlson, Elton Graves, Ralph Grimaldi, Joshua Holden, Thomas Langley, Jeffery Leader and Ken McMurdy: Annual Joint AMS/MAA Meetings in Atlanta, Georgia.

Allen Broughton, David Finn, Joshua Holden, Mark Inlow, Thomas Langley and David Rader: attended the spring Indiana MAA Meeting held in April @ IUPUI in Ft. Wayne.

Kurt Bryan, Stephan Carlson and David Finn: attended MathFest 2004 in Providence, Rhode Island, in August 2004.

Elton Graves: ASEE National Meeting in June 2004.

Joshua Holden: attended the Algorithmic Number Theory Symposium VI at the University of Vermont in June 2004.

Mark Inlow: was invited and attended the NSF Workshop, “A Data-Oriented, Active-Learning, Post-Calculus Introduction to Statistical Concepts, Applications and theory,” at California State Polytechnic University in June 2004.

Kenneth McMurdy: attended A Number Theory Conference in Honor of Harold Stark at the University of Minnesota, August 2004 and attended 19th Annual Workshop on Automorphic Forms and Related Topics, University of North Texas, March 2005.

Diane Evans: attended the annual Joint Statistical Meeting in Toronto, Canada, in August 2004.

Stephan Carlson and Joshua Holden: attended math conference @ Miami University of Ohio in Oxford, Ohio, in October 2004.

David Rader: October 2004 INFORMS Conference in Denver, CO. Workshop organizer.

Ken McMurdy: Midwest Number Theory Conference held in Chicago in October 2004. Attended the Conference on Automorphic Forms @ the University of North Texas in Denton.

Brian Martensen: “Coupled 60” Differential Equation Conference at the University of Houston in February 2005.

Ralph Grimaldi: 2005 Southeastern Combinatorics Conference in Boca Raton in March 2005.

Other professional development and student mentoring activities

Allen Broughton: Ongoing research in automorphism of Riemann surfaces.

Kurt Bryan: Continued work with Lester Caudill, University of Richmond, on inverse problems related to thermal imaging. They are also currently working on another paper related to the resolution limits for thermal methods in nondestructive testing. Dr. Bryan continues work with Michael Vogelius of Rutgers University on the asymptotic behavior of solutions to the heat equation with nonlinear boundary conditions. Dr. Bryan assumed the position of Director of Rose-Hulman's summer REU program in 2004, supervised a group of four REU students over the summer, and recruited four students for this year's REU. He continues to organize the math department's weekly seminar.

Stephan Carlson: On sabbatical leave for winter and spring quarters, 2004-05, working as a Visiting Mathematician for the Mathematical Association of America. Finalized proposal to direct a Professional Enhancement Program (PREP) Workshop entitled "Undergraduate Topology: An Institution-Based and Example-Driven Approach" accepted by the MAA (funded by NSF Grant DUE-0341481).

Diane Evans: Co-organizer with Dr. Mark Inlow) of the 2005 Annual Rose-Hulman Undergraduate Mathematics Conference, March 18 & 19, 2005. Advised undergraduate students on analyzing data for projects and assignments. On the integrated project committee for Dean Heaton in the Engineering Management program, "Proposal Installation and Qualification of a new Electronics Assembly Line".

David Finn: Ongoing research project on existence and behavior of solutions to nonlinear elliptic partial differential equations in differential geometry that will be his contribution to the department's REU summer 2006 program. Imaging Systems Faculty member.

Elton Graves: Member of Master's Thesis Committee for Aaron Rausch in Mechanical Engineering, "The Development of Methods for Assessing, Modeling and Controlling Impulsive Noise".

Joshua Holden: Ongoing work on graph theory related to blackwork embroidery. Ongoing work on number systems related to high-speed digital multiplierless FIR filters. Ongoing work on graph-theoretic structure of the discrete logarithm map. Contributed homework problems to the next edition of Cryptography and Network Security, by William Stallings. Advisor, Senior Thesis on graph-theoretic structure of the discrete logarithm map, Dan Cloutier, CSSE department

Mark Inlow: Assisted undergraduate Jennifer Guerard with analyzing chemistry data which she presented at several conferences, on and off campus, including Fifth Annual Indiana Local American Chemistry Society Section Poster Session, DePauw University, October 2004: "Probing the Photochemical Transformation of Dissolved Organic Matter From an Antarctic Lake Using UV/VIS Absorption Spectrophotometry," Jennifer Guerard, Mark Inlow, Melissa Avery, and Penney Miller.

Advised graduate students Seana Giardini and Joshua Karnes on how to analyze data for their M.S. theses. Seana received the Program Chair's Award for her presentation, "Monitoring Femoral Component Installation Using Vibration Testing". Advised various undergraduate students on analyzing data for projects.

Thomas Langley: Supervised four students in the summer 2004 /REU program. Recruited four students for the summer 2005 REU program. Preparing monograph "Cwatsets" in collaboration with Gary Sherman (senior author)

Roger Lautzenheiser: Editor of the Mathematics Undergraduate Journal.

Jeffery Leader: Co-sponsored a CSSE senior project with Gary Stuart of ISU. Also co-sponsored a Weaver Grant (for Justin Droba) with David Voltmer of ECE. Edited the ninth edition of Howard Anton's Elementary Linear Algebra textbook (Wiley) and developed materials for its web site.

David Rader: Advisor for 2005 Mathematical Contest in Modeling, which yielded two Honorable Mention commendations.

John Rickert: Research while on sabbatical at the National Security Agency

Yosi Shibberu: Actively involved during the summer and fall quarter of 2004 with the MEED group, an interdisciplinary group of Rose-Hulman faculty organized to develop and implement a new senior design sequence which encourages entrepreneurship.

4.c Faculty and Staff Professional Service

RHIT Committee Chairs

- Admissions and Standing Committee – Elton Graves
- Technology Committee – Joshua Holden
- Academic Software Committee – Allen Broughton
- Graduate Studies Committee – Jeffery Leader
- Honors and Awards – David Rader
- Parallel Computing – Allen Broughton
- Web Enhanced Instruction Planning Team – Allen Broughton

Other Professional Service and Outreach Activities

Allen Broughton: Departmental Webmaster.

Stephan Carlson: Member of Indiana MAA Section Distinguished Service Award Selection Committee (2nd year of 3 year term). Member and Chair of MAA National Committee on SIGMAAs (Special Interest Groups of the MAA). Member of MAA National MathFest Site Selection Committee. Served as member of the External Review Team to evaluate the Department of Mathematics and Computer Science at Colorado College, Colorado Springs, CO, March 2005. Member of MAA Strategic Planning Working Group on Professional Development (2005-06).

Diane Evans: Reviewed an introductory statistics book from John Wiley Publishing Company. Reviewed articles for *The College Math Journal*, *The American Statistician*, and the *Journal of Statistics Education*. Member of the Leaves Committee, and the RHIT Institute Animal Care and Use Committee (IACUC). Secretary of the Student Affairs Committee. Co-organizer of UGMC noted below.

David Finn: Continued to review papers and research monographs for *Mathematics Reviews*, refereed papers for *College Mathematics Journal*, *International Journal of Mathematics* and *Mathematical Sciences*, *Journal of Functional Analysis*. Serves as INMAA Newsletter Editor and MAA departmental liaison.

William S. Galinaitis: Reviewed paper “Approximate Inversion of Hysteresis with Application to Control of Smart Actuators”, for IEEE Transactions on Automatic Control. Reviewer for NSF Proposal 0506126, “Optimal Control and game theory for systems with memory and impulses”. Assisted with the High School Math Contest, the Regional and State MathCounts contests, and the Undergraduate Math Conferences.

Elton Graves: Indiana State Director of AMC 8 and AMC 10/12. Co-ordinator for Francis Vigo Chapter of MATHCOUNTS. Site Co-ordinator for state MATHCOUNTS competition. Co-organizer of session on “Meeting the Challenge: Relationship between Mathematics and Biology in the 21st Century” (MAA National Meeting 2005). Member MAA subcommittee Mathematics Across the Disciplines (MAD). Project NEXT IN mentor. Refereed paper for *The College Mathematics Journal*, and several papers for ASEE.

Ralph Grimaldi: Coordinator of Rose-Hulman High School Mathematics Contest.

Joshua Holden: Reviewer for RHIT Undergraduate Mathematics Journal, *Cryptologia*, Houghton Mifflin Company, and Princeton University Press. Co-organizer of 23rd Annual Rose-Hulman Undergraduate Mathematics conference. Assisted with 39th Annual Rose-Hulman High School Mathematics Competition.

Mark Inlow: Co-organizer of UGMC noted below. Assist with High School Math Competition

Thomas Langley: Organized Indiana Section Project NExT Workshop with Will Turner of Wabash College at the Fall Trisection MAA meeting in Evansville.

Jeffery Leader: Elected to the Faculty Affairs Committee, filling out John Rickert's unexpired term.

Christopher Leisner: Assisted with proctoring Freshmen Mathematics Placement Exam, and with the High School Mathematics Competition. Served as judge for 16th Annual Alfred R. Schmidt Freshman Math Competition.

David Rader: Continued to serve as the MAA section's Public Information Officer.

Gary Sherman: Refereed for Mathematics Magazine. Spent summer of 2004 working for Ventures to evaluate Eagle Creek Systems' proposal to revolutionize database management using extensible set theory.

4.d Faculty Honors and Awards

Joshua Holden's presentation. "The Graph Theory of Blackwork Embroidery" was chosen for the AMS "Highlights of the 2005 Joint Mathematics Meetings" web page.

4.e Membership in Faculty Clusters

Imaging Systems Faculty Allen Broughton David Finn, Joshua Holden, Chris Leisner
Parallel Computing Users Group Allen Broughton, Joshua Holden, Jeff Leader

5. Grants and Continuing Grant activities

The Rose-Hulman NSF-Research Experience for Undergraduates Program will continue during the upcoming summer. This summer's program, which will be directed by *Kurt Bryan* and *Thomas Langley*, is the eighteenth consecutive year of the program.

A \$2,000 grant was submitted by *Diane Evans* and funded by the Mathematical Association of America (through NSF) for the annual Rose-Hulman Undergraduate Mathematics Conference.

The CCLI Grant finished work and extended work on the CCLI Grant (have requested a no-cost extension from the NSF - *David Finn*)

William S. Galinaitis initiated transfer of NSF Grant 0105190 "Minimization of actuator hysteresis under varying load and temperature conditions", from Ferrum College to RHIT.

6. Departmental Programs

Fast Track Calculus 50 students, Director Elton Graves, Instructors: Elton Graves and Roger Lautzenheiser.

Rose-Hulman Undergraduate Mathematics Journal Editor Roger Lautzenheiser, Assistant editor David Rader; through and including Issue 1 of Vol. 6, 2005, there have been 64 papers and 109 authors.

Rose-Hulman High School Mathematics Competition (thirty-ninth annual). Organizers Ralph Grimaldi, and Joshua Holden. Approximately 500 students participated.

Rose-Hulman Undergraduate Mathematics Conference (March 2005, 22nd annual), co-organizers, Diane Evans and Mark Inlow, 12 student talks, about 80 conference participants.

MATHCOUNTS Regional and State competitions Elton Graves, Denis Radecki and William Eccles local co-organizers