

CURRICULUM VITAE

EZRA A. BROWN

Education

- Ph. D. Mathematics, Louisiana State University, August 1969
- M.S. Mathematics, Louisiana State University, August 1967
- B. A. Mathematics, Rice University, June 1965

Professional Experience

- Alumni Distinguished Professor, Mathematics Department, Virginia Tech, 2005-present; Professor, 1981-2005; Associate Professor, 1973-81; Assistant Professor, 1969-73
- Mathematician, Department of Defense, Washington DC, 1993-present (summers)
- Consultant to Project NExT (New Experiences in Teaching) Fellows, 1998, 2001, 2003-08
- Sabbatical Mathematician, Department of Defense, Washington DC, 1991-92
- Consulting Mathematician, Center for Communications Research, Princeton NJ, 1989-90, 2009 (summers)
- Reader for the Advanced Placement Examinations in Mathematics, 1981-86
- Visiting Professor, Math Institute, University of Munich, Germany, 1978-79

National/Regional Honors and Awards

- Mathematical Association of America 2006 George Polya Award for Excellence in Expository Writing for "Phoebe Floats!," *College Mathematics Journal* **36** (2005), 114-122
- MAA 2003 Carl B. Allendoerfer Award for Excellence in Expository Writing for "The Many Names of $(7,3,1)$," *Mathematics Magazine* **75** (2002), 83-94
- MAA 2001 George Polya Award for Excellence in Expository Writing for "Three Fermat Trails to Elliptic Curves," *College Mathematics Journal* **31** (2000), 162-172
- MAA 2000 George Polya Award for Excellence in Expository Writing for "Square Roots from 1; 24, 51, 10 to Dan Shanks," *College Mathematics Journal* **30** (1999), 82-95
- Golden Key International Honor Society 2000 Mid-Atlantic Region Advisor of the Year
- MAA MD-DC-VA Section 1999 John M. Smith Award for Outstanding Teaching

Virginia Tech Honors and Awards

- Alumni Distinguished Professorship, 2005
- Commencement Address, University Commencement Exercises, Fall 2003
- ODK G. Burke Johnston Award for Teaching Excellence, 2000
- Upsilon Pi Epsilon National Computer Science Honor Society, 1999
- Academy of Teaching Excellence, 1998
- William E. Wine Award for Excellence in Teaching, 1998
- MAA Student Chapter Outstanding Professor Award, 1998, 2000, 2002
- Edward S. Diggs Teaching Scholar Award, 1997
- Honorary Member of Golden Key International Honor Society, 1996
- Mortar Board Last Lecturer, 1996
- College of Arts and Sciences Certificate of Teaching Excellence, 1991

Ph. D Students

- Robert Johnson, Graphical Sequences. Ph. D. in Mathematics, 1974.

- Bruce Landman, Generalized van der Waerden Numbers. Ph. D. in Mathematics, 1983.

Master of Science Students

- Lawrence Gosnell, Quadratic Forms over Fields of Characteristic 2. M. S. in Mathematics, 1973.
- Kenneth Hawkes, Perfect Numbers and other Numbers Defined by the Sum of Their Divisors. M. S. in Mathematics, 1975.
- Robert Ellis, Cubical Complexes. M. S. in Mathematics, 1996.
- Matthew Briggs, The General Number Field Sieve. M. S. in Mathematics, 1998.
- Karen Potanka, Symmetry and Automorphism Groups of Graphs. M. S. in Mathematics, 1998.
- John McGee, Schoof's Algorithm for Counting Points on Elliptic Curves. M. S. in Mathematics, 2006.
- Courtney Baber, List Colorings of Graphs. M. S. in Mathematics, 2009.

Publications in refereed journals

1. Representations of discriminantal divisors by binary quadratic forms, *Journal of Number Theory* **3** (1971), 213-225.
2. Theory of bivectors (with J. D. Zund), *Tensor (New Series)* **22** (1971), 179-185.
3. A theorem on biquadratic reciprocity, *Proceedings of the American Mathematical Society* **30** (1971), 220-222.
4. The class number of $\mathbb{Q}(\sqrt{-p})$, for $p \equiv 1 \pmod{8}$ a prime, *Proceedings of the American Mathematical Society* **31** (1972), 381-383.
5. Quadratic forms and biquadratic reciprocity, *J. reine und angewandte Mathematik* **253** (1972), 214-220.
6. Discriminantal divisors and binary quadratic forms, *Glasgow Mathematical Journal* **13** (1972), 69-73.
7. A class of planar four-colorable graphs (with L. W. Johnson), *Israel Journal of Mathematics* **11** (1972), 53-56.
8. Doubly regular tournaments are equivalent to skew-Hadamard matrices (with K. B. Reid), *Journal of Combinatorial Theory (Series A)* **12** (1972), 332-338.
9. Binary quadratic forms of determinant $-pq$. *Journal of Number Theory* **4**(1972), 408-410.
10. Quasiperfect numbers (with H. L. Abbott, C. E. Aull, and D. Suryanarayana), *Acta Arithmetica* **22** (1973), 489-497.
11. Class numbers of imaginary quadratic fields having exactly three discriminantal divisors (with C. J. Parry), *J. reine und angewandte Mathematik* **260** (1973), 31-34.
12. Biquadratic reciprocity laws, *Proceedings of the American Mathematical Society* **37** (1973), 374-376.
13. The power of 2 dividing the class number of a binary quadratic discriminant, *Journal of Number Theory* **5** (1973), 413-419.
14. Class numbers of complex quadratic fields, *Journal of Number Theory* **6** (1974), 185-191.
15. Class numbers of real quadratic number fields, *Transactions of the American Mathematical Society* **190** (1974), 90-107.
16. A lemma of Stark, *J. reine und angewandte Mathematik* **265** (1974), 201.
17. The imaginary bicyclic biquadratic fields of class number one (with C. J. Parry), *J. reine und angewandte Mathematik* **266** (1974), 118-120.
18. Class numbers of quadratic fields, *Symposia Matematica* **15** (1975), 403-411.

19. Diophantine equations of the form $x^2 + D = y^m$, *J. reine und angewandte Mathematik* **274/275** (1975), 385-389.
20. Representations of discriminantal divisors by binary quadratic forms II, *J. reine und angewandte Mathematik* **286/287** (1976), 132-137.
21. The Diophantine equation $x^2 + 3 = 7^m$, *J. reine und angewandte Mathematik* **288** (1977), 74-76.
22. Diophantine equations of the form $ax^2 + Db^2 = y^p$, *J. reine und angewandte Mathematik* **291** (1977), 118-127.
23. The 2-class group of certain biquadratic number fields (with C. J. Parry), *J. reine und angewandte Mathematik* **295** (1978), 61-71.
24. The 2-class group of certain biquadratic fields II (with C. J. Parry), *Pacific Journal of Mathematics* **78** (1978), 11-26.
25. Circularity in graphs and continua: combinatorics (with H. Bell, R. F. Dickman and E. L. Green), *Houston Journal of Mathematics* **6** (1980), 455-470.
26. The first proof of the quadratic reciprocity law revisited, *American Mathematical Monthly* **88** (1981), 257-264.
27. Circularity in graphs and continua: topology (with H. Bell, R. F. Dickman and E. L. Green), *Fundamenta Mathematica* **112** (1981), 103-110.
28. Social relativity: the motion of groups and actors (with C. J. Dudley), *The Sociological Quarterly* **22** (1981), 313-326.
29. The class number of $\mathbb{Q}(\sqrt{-pq})$, for $p \equiv -q \equiv 1 \pmod{4}$ primes, *Houston Journal of Mathematics* **7** (1981), 497-505.
30. The class number of $\mathbb{Q}(\sqrt{-2q})$, for $p \equiv 1 \pmod{16}$ a prime, *Journal of Number Theory* **16** (1983), 95-99.
31. Sets in which $xy + k$ is always a square, *Mathematics of Computation* **45** (1985), 613-620.
32. The euclidean (mod U) property in quadratic number fields (with Daniel Shapiro and Raj Markanda), *Acta Arithmetica* **47** (1986), 143-152.
33. Diophantine equations of the form $x^4 + dx^2y^2 + y^4 = z^2$: Some cases with only trivial solutions—and a solution Euler missed, *Glasgow Mathematical Journal* **31** (1989), 297-307.
34. Partitions of bi-partite numbers into at most j parts (with Bruce Landman and Frederick Portier), *Graphs and Combinatorics* **8** (1992), 65-73.
35. Periodic seeded arrays and automorphisms of the shift. *Transactions of the American Mathematical Society* **339** (1993), 141-162.
36. Why not try a sabbatical at the National Security Agency? *Notices of the American Mathematical Society* **41** (1994), 451-452.
37. Directed graphs defined by arithmetic (mod n), *Fibonacci Quarterly* **35** (1997), 346-351.
38. Square roots from 1; 24, 51, 10 to Dan Shanks, *College Mathematics Journal* **30** (1999), 82-95.
39. Three Fermat trails to elliptic curves, *College Mathematics Journal* **31** (2000), 162-172.
40. Magic squares, finite geometries and points of inflection on elliptic curves, *College Mathematics Journal* **32** (2001), 260-268.
41. Diophantine triplets and the Pell sequence (with M. N. Deshpande), *Fibonacci Quarterly* **39** (2001), 242-249.
42. Cycles of directed graphs defined by arithmetic (mod n) (with Theresa P. Vaughan), *Discrete Mathematics* **239** (2001), 109-120.
43. The many names of (7,3,1), *Mathematics Magazine* **75** (2002), 83-94.

44. Elliptic curves from Mordell to Diophantus and back (with Bruce Myers), *American Mathematical Monthly* **109** (2002), 639-649.
45. Three connections to continued fractions, *Pi Mu Epsilon Journal* **11** (2002), 241-250.
46. The sliding ladder, *Math Horizons* **11** (September 2003), 31.
47. The fabulous (11,5,2) biplane, *Mathematics Magazine* **77** (2004), 87-100.
48. Configurations with subset restrictions (with Theresa P. Vaughan), *Journal of Combinatorial Mathematics and Combinatorial Computing* **48** (2004), 197-215.
49. The ancient world's magical genius thinks big, *Math Horizons* **12** (November 2004), 5-8.
50. A conversation with Leonardo Pisano, *Math Horizons* **12** (February 2005), 16-18.
51. Phoebe Floats, *College Mathematics Journal* **36** (2005), 114-122.
52. Hyperelliptic curves with compact parameters (with Bruce Myers and Jerome Solinas), *Designs, Codes and Cryptography* **36** (2005), 245-261.
53. A conversation with Lewis Carroll, *Math Horizons* **14** (November 2006), 9-11.
54. Whodunit? *Math Horizons* **14** (April 2007), 25-26, 28-29.
55. Fibonacci's forgotten number (with Jason C. Brunson), *College Mathematics Journal* **39** (2008), 112-120.
56. Kirkman's schoolgirls walking through fields of numbers (with Keith Mellinger), *Mathematics Magazine* **82** (2009), 3-15.
57. A dozen problems about hats (with James Tanton), *Math Horizons* **16** (April 2009), 22-25.
58. Why Is $PSL(2, 7) \cong GL(3, 2)$? (with Nicholas Loehr), *American Mathematical Monthly* **116**, (2009), 727-731.
59. Chocolate Key Cryptography, (with Dale Bachman and Anderson Norton), to appear in *Mathematics Teacher*.
60. A conversation with Archimedes, to appear in *Math Horizons*.
61. A mathematical trip to Princeton, to appear in *Math Intelligencer*.
62. Many more names of (7,3,1) (with Jason C. Brunson), in preparation.
63. Cyclic pentagons with integer sides and rational area (with Ralph Heiner Buchholz), in preparation.
64. Solving cubic equations from Archytas to Newton, in preparation.
65. A baker's dozen Archimedean semiregular polyhedra, in preparation.
66. An ancient algorithm: 29,000 years old (with Helaman Ferguson), in preparation.

Twenty-six (refereed) classified publications for the Department of Defense, 1989-2009

Books

- Regiomontanus: His Life and Work, a translation of Ernst Zinner's Leben und Werken des Johann Muller von Koenigsberg, genannt Regiomontanus. North-Holland, Amsterdam-New York, 1990. X+402 pp.
- Biscuits of Number Theory, a collection of expository articles on number theory, co-editor with Arthur Benjamin. Dolciani Mathematical Expositions #34, Mathematical Association of America, Washington DC, 2009. xiii+311 pp.

Book Chapters

- "What I Wish They'd Told Me: Notes from the Trenches of Academe", in *Teaching Excellence at a Research University* (E. Scott Geller and Philip K. Lehman, editors), Chapter 8 (pp.49-54), Pearson Custom Publishing, Boston, 2007.

Book Reviews

- Daniel A. Marcus, Number Fields. Springer-Verlag, New York-Heidelberg, 1977, *Mathematical Reviews* 56 (1978), #15601.

- Harvey Cohn, *A Classical Invitation to Algebraic Numbers and Class Fields*. Springer-Verlag, New York-Heidelberg, 1978, *Mathematical Reviews* 80c (1980), 12001.
- Helmut Hasse, *Number Theory* (3rd ed., English Translation). Akademie-Verlag, Berlin, 1979. *Mathematical Reviews*. 81c:(1981), 12001 a, b.
- Andre Weil, *Number Theory*. Birkhauser, Boston-Basel-Stuttgart, 1984, *Mathematical Reviews* 85c (1985), 01004.
- Extended review of “Early Astronomy” by Hugh Thurston (Springer-Verlag, 1996), *American Mathematical Monthly* **104** (1997), 988-991.
- Extended review of “Combinatorics of Symmetric Designs”, by Y. J. Ionin and M. S. Shrikhande (New Mathematical Monographs 5, Cambridge University Press, Cambridge, 2006), *MAA Reviews* (2006), <http://mathdl.maa.org/mathDL/19/>.
- Extended review of “Handbook of Combinatorial Designs” (second edition), by Charles J. Colbourn and Jeffrey H. Dinitz, editors (Discrete Mathematics and its Applications, Chapman & Hall/CRC, Boca Raton FL, 2007), in *MAA Reviews* (2007), <http://mathdl.maa.org/mathDL/19/>.
- Extended review of “Kiss My Math”, by Danica McKellar (Hudson Street Press, New York, 2008), in *MAA Reviews* (2008), <http://www.maa.org/maa%20reviews/9231.html>
- Extended review of “The Archimedes Codex” by Reviel Netz and William Noel (Da Capo Press, 2007), *Math Horizons* **16** (February 2009), 26-27.
- Extended review of “The Book of Numbers” by John Conway and Richard Guy (Springer-Verlag, 1996), *Math Horizons*, to appear.

Invited Talks

- Over 100 invited presentations and colloquia on research topics, including invited hour addresses to the MD-DC-VA (1999, 2007) and the Northeastern (2001, 2004 (the Christy Lecture), 2007) Sections of the Mathematical Association of America; banquet keynote address at MathFest 2001; a two-hour workshop for Project NExT Fellows at MathFests 2007 and 2008; a one-hour version of that workshop at the Joint Math Meetings, 2008 and 2009; the Student Activities Lecture at MathFest 2008
- Numerous lectures on number theory, cryptography and network security both at Virginia Tech and at other universities, colleges, high schools, and professional organizations, including student groups at Wesleyan, Radford, Wake Forest, Marshall, St. Mary’s College of Maryland, UNC-Greensboro and Hampton Universities; the Department of Defense; North Cross School (Roanoke), the Virginia Governor’s School summer session at Virginia Tech, Blacksburg High School, the Maggie Walker Governor’s School (Richmond), the Southwest Virginia Governor’s School (Dublin), the Roanoke Valley Governor’s School (Roanoke), and Walt Whitman High School, Bethesda MD; keynote speeches for the Virginia Computer Users Conference (1994), the All-School Colloquium on Mathematics at Woodberry Forest School (1996), and Math Awareness Month at Virginia Tech (1997, 2002) and Worcester Polytechnic Institute (2002); the Norman W. Johnson Lecture at Wheaton (MA) College (2004).
- Appeared on “Math: No Problem,” a segment of the Virginia Foundation for Humanities radio show *With Good Reason*, broadcast state-wide the week of January 26-30, 2004

Presentations to Alumni and other University Groups

- More than a dozen since 2005, including alumni chapters, class reunions, new faculty orientations, and the Old Guard.

Teacher Development

- Workshop leader, NSF Workshop for High School Teachers on Mathematical Studies in Modeling, Mount St. Mary's College, 1993-96
- Presentation at Virginia Tech Faculty Development Initiative Workshop, 1995
- Mentor to fifteen graduate teaching assistants since 1992
- Mentor/Trainer of Student Helpers at the Math Emporium, 1999-2002
- Guest speaker at CEUT GTA Seminar, 1999-2005
- Dossier preparation workshop for the Academy of Teaching Excellence, 1997-present
- GTA Training Workshop (with other Diggs Scholars), 1997-present

Program Development

- Developed (with Lorraine Holub) the Calculus Emerging Scholars Program (ESP), 1996-2001, with grants totaling \$339,540 (for pilot and full-scale projects) from Provost and Dean of Arts & Sciences
- ESP Project Director, 1996-2002
- Developed or revitalized four courses in Mathematics at the senior and graduate level: Graph Theory, History of Mathematics, Advanced Discrete Mathematics, and Cryptography

Unusual Teaching Contributions

- Taught Vector Geometry via email to a Freshman who was out of school for a semester due to illness, 1994
- Taught Number Theory via email to two high school students at Woodberry Forest School, 1996-97
- Taught 4 Freshman Honors Seminars (1971-73), 4 University Colloquia on Fantasy and Science Fiction (1974, 1975-76, 1978), 5 University Colloquia on Duke Ellington (1981-85), two University Colloquia on Problem Solving (2001, 2003)
- Taught the University Jazz Ensemble, 1973-74
- Rhodes/Marshall Mock Interviews, 1995-96, 1998
- Freshman Conversations (an honors program to orient Freshmen), 1996
- Mentor to student applying for Daughtrey (University Honors) Scholarship, 1999
- Mentor to Ashley White, University Honors Scholar, 2002; Marshall Scholar, 2005
- Mentor to David Gagnon, Horton Honors Scholar, 2004
- Mentor to Brad Shapiro, Class of 1954 University Honors Scholar, 2006

Student Research Projects

- Fourteen M.S. oral presentations (Catherine Stephens, Angela O'Kernick, Rita Cox, Stan Hartzler, Darrell Wells, Mike Rudacille, David Ferguson, Kurt Edmiston, Audrey Doughty, David Profili, Rose Feor, David Collins, Bastian Erdnuess, Jessica Kline, Lacey Ore) since 1995
- Seventeen undergraduate research projects in mathematics and the honors program since 1990
- Mentor to more than four dozen students in the Director's Summer Program and other summer research programs, Department of Defense, 1994 to present.

Professional Service

- Associate Editor, *American Mathematical Monthly*, 1992-present
- Editorial board, *INTEGERS – The Electronic Journal of Combinatorial Number Theory*, 1998 to present
- Editorial board, *Math Horizons*, 2004 to present

- Referee for Virginia Junior Academy of Sciences Papers, 1997, 1999
- Organizer of **SERMON 2000**, the 13th annual **South East Regional Meeting On Numbers** at Virginia Tech, April 14-15, 2000
- Local Arrangements Liaison for the MAA MD-DC-VA Section Meeting at Virginia Tech, October 19-20, 2001
- MAA Committee to Select the Recipients of the Carl B. Allendoerfer Award, 2001-2002, 2005-2008; chair, 2008 (given for articles of expository excellence in *Mathematics Magazine*)
- MAA Committee to Select the Recipients of the Merten M. Hasse Award, 2009 to present; (given for articles of expository excellence by a mathematician under 40)
- MAA MD-DC-VA Section Teaching Award Committee, 1999-2005; Chair, 2000-2005
- Section Nominations Committee, 2001-2006
- Section Program Chair, 2004-2006
- Section Governor, 2007-present
- Project NExT Course “Starting and Maintaining Your Mathematical Research Program,” given at MathFests 2007 and 2008 and Joint Math Meetings 2008 and 2009
- Over 110 papers refereed for over a dozen journals
- Over 150 papers reviewed

Professional Organizations and Activities

- Mathematical Association of America, 1975-present
- American Mathematical Society, 1969-1975
- Pi Mu Epsilon national mathematics honor society, 2006-present

University Service

- Commission on Undergraduate Studies and Policies, 1987-91, 1992-96; Chair, 1993-94 and 1995-96
- Committee on Undergraduate Curricula, 1987-91, 1992-96; Chair 1992-93, 1994-95
- University Library Committee, 1983, 1984-87
- University Search Committee for Director of Libraries, 1984-85
- University Search Committee for Vice-Provost for Academic Affairs, 1995-96
- University Commencement Committee, 1994-97, 1999-2008
- University Council, 1993-94, 1995-96
- Chapter advisor to Golden Key International Honor Society, 1996-2001
- Search Committee for Assistant Director of University Honors, 1996-97
- Provost’s Committee on Student Success, 1996–98
- Goldwater Scholarship Committee, 1997
- Class of 1954 Honors (formerly University Honors, formerly Daughtrey) Scholarship Committee, 1997-98, 2000-01, 2003, 2007
- Diggs Teaching Scholar Award Committee, 1997-99; Chair, 1998-99
- University Committee to Select the Wine Award recipients, 1999-2001, 2005; Chair, 2000-01
- University Committee to Select the Alumni Teaching Award recipients, 1999-2001; Chair, 2002-03
- Academy of Teaching Excellence Executive Committee, 1999-2004; Chair, 2002-03
- Faculty Committee to select students for the University Honors Community and major University scholarships, 2001-present
- Horton Honors Scholarship Committee, 2005, 2008

- University Search Committee for the Dean of the College Of Science, 2005-06
- University External Awards Committee, 2006-present
- University Search Committee for the Director of University Honors, 2007-08

College Service

- College of Arts and Sciences (CAS) Commencement Committee, 1972-87
- CAS Library Committee, 1976-78, 1980-83, 1986-87 (including 3 years as Chair)
- CAS Nominations Committee, 1986, 1987
- CAS Curriculum Committee (ex officio), 1987-91, 1992-96
- CAS Committee to Select Outstanding Senior, 1996, 1997
- CAS Wine Award Committee, 1998-2002; Chair, 1999-2000
- College of Science (COS) Wine Award Committee, 2003-2006; Chair, 2004-05
- COS Teaching Excellence Committee, 2003-04, 2009-present; Chair, 2003-04
- COS Honorifics Committee, 2005-present

Departmental Service (highlights)

- Chair, Teaching Committee, 1993-96, 2007-present.
- Responsible for preparing dossiers for colleagues nominated by the Mathematics Department for college and university-level teaching, advising and outreach awards (22 awards received), 1993-present
- Applied Discrete Mathematics Option Committee, 1993-98 (including 4 years as Chair)
- Undergraduate and Graduate Advisor, 1976-present
- Personnel Advisory Committee, 1977-78, 1981-82, 1997-2000
- Undergraduate Program Committee, 1982-86, 1993-98
- Faculty advisor, Math Club/Student Chapter of MAA, 1997-present

Community

- Over forty performances with the Virginia Tech Jazz Ensemble, including a year as director
- Forty-three performances with the Blacksburg Master Chorale
- Six performances with Opera Roanoke