

## G. GRIFFITH ELDER

### Curriculum Vita

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Department of Mathematics  
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### Education.

Ph.D. Mathematics, **The Ohio State University**, 1993  
Thesis: *The Galois module structure of the integers in wildly ramified extensions*  
Advisor: Manohar L. Madan.  
B.S. cum laude, Mathematics, **Davidson College**, 1986  
Budapest Semesters in Mathematics, Spring 1985

### Professional Experience.

Professor, UNO, 2008 – present  
Maurice and Nancy Lipton Professor of Mathematics, UNO, 2007 – present  
Associate Professor, UNO, 2001 – 2008  
Visiting Associate Professor, Virginia Tech (VT), 2005 – 2007  
Assistant Professor, UNO, 1995 – 2001  
Lecturer, The Ohio State University (OSU), 1993 – 1995

### Visiting Positions.

Visitor, Université de Bordeaux, May 1995

### Research Interest.

Algebraic Number Theory

### Grants and Fellowships.

National Science Foundation  
DMS-0201080 *RUI: Galois Structures in Local Number Fields*, 2002 – 2005, \$117,224  
UNO  
*Multiplicative Galois Structure in Biquadratic Number Fields*, UCR F 2003-11, \$2,100  
Faculty Development Fellowship (Sabbatical). 2002-2003.  
*Symmetry, Structure in Bicyclic Number Fields*, UCR F 2001-09, \$4,500  
*Visit of Dr. Nigel P. Byott, University of Exeter*, UCR MG 2000-03, \$411.50  
*Symmetry and Structure in Integers*, UCR F 99-28, \$3,530  
*Galois Structure in Wild Number Fields*, UCR 96-ART-34, \$3,300  
OSU  
*Presidential Fellowship*, 1992-1993

## Publications.

### A. Articles.

- (13) Nigel P. Byott and G. Griffith Elder, *On the necessity of new ramification breaks*, J. Number Theory, **129** (2009), no. 1, 84–101.
- (12) G. Griffith Elder, *Galois scaffolding in one-dimensional elementary abelian extensions*, Proc. Amer. Math. Soc., **137** (2009), no. 4, 1193–1203.
- (11) G. Griffith Elder and Jeffrey J. Hooper, *On wild ramification in quaternion extensions*, J. Théor. Nombres Bordeaux, **19** (2007), no. 1, 101–124.
- (10) Nigel P. Byott and G. Griffith Elder, *A valuation criterion for normal bases in elementary abelian extensions*, Bull. Lond. Math. Soc., **39** (2007), no. 5, 705–708.
- (9) G. Griffith Elder, *The Galois structure of ambiguous ideals in cyclic extensions of degree 8*, Noncommutative algebra and geometry, 63–89, Lect. Notes Pure Appl. Math., Vol. 243, Chapman & Hall/CRC, Boca Raton, FL, 2006.
- (8) Nigel P. Byott and G. Griffith Elder, *New ramification breaks and additive Galois structure*, J. Théor. Nombres Bordeaux, **17** (2005), no. 1, 87–107.
- (7) G. Griffith Elder, *On Galois structure of the integers in cyclic extensions of local number fields*, J. Théor. Nombres Bordeaux, **14** (2002), no. 1, 113–149.
- (6) Nigel P. Byott and G. Griffith Elder, *Biquadratic Extensions with One Break*, Canad. Math. Bull., **45** (2002), no. 2, 168–179.
- (5) G. Griffith Elder, *Galois module structure of ideals in wildly ramified biquadratic extensions*, Canad. J. Math., **50** (1998), no. 5, 1007–1047.
- (4) G. Griffith Elder and Manohar L. Madan, *Galois module structure of integers in wildly ramified  $C_p \times C_p$  extensions*, Canad. J. Math., **49** (1997), no. 4, 722–735.
- (3) G. Griffith Elder, *Galois module structure of integers in wildly ramified cyclic extensions of degree  $p^2$* , Ann. Inst. Fourier (Grenoble), **45** (1995), no. 3, 625–647 (errata *ibid.* **48** (1998), no. 2, 609–610).
- (2) G. Griffith Elder and Manohar L. Madan *Galois module structure of integers in weakly ramified extensions*, Arch. Math. (Basel), **64** (1995), no. 2, 117–120.
- (1) G. Griffith Elder and Manohar L. Madan, *Galois module structure of integers in wildly ramified cyclic extensions*, J. Number Theory, **47** (1994), no. 2, 138–174.

### B. Preprints.

- G. Griffith Elder, *A valuation criterion for normal basis generators in local fields of characteristic  $p$* , arXiv:0802.1619v1 [math.NT].

## Invited Presentations (since 2002).

- “Valuation criterion for normal basis generators and Galois scaffolding in local fields,” Special Session on Number Theory and Applications in Other Fields at the AMS Southeastern Sectional Meeting in Baton Rouge, LA, March 28–30, 2008.
- “One-dimensional elementary abelian extensions,” Algebra Seminar. Colorado State University, December 14, 2006.

- “Ramification and Additive Galois Structure,” Conferencia, Departamento de Control Automático, Centro de Investigación y de Estudios Avanzados del I.P.N., Mexico City, Mexico, May 30, 2006.
- “Elementary abelian extensions of local fields,” Special Session on Hopf Algebras and Galois Module Theory at the AMS Eastern Sectional Meeting in Durham, NH, April 18–19, 2006.
- “Ramification and Galois structure in 1-dimensional elementary abelian local extensions,” Pure Maths Seminar, University of Exeter, England. June 24, 2005.
- “Local–global problems in number theory,” Plenary Talk at the 6th Annual Regional Workshop in the Mathematical Sciences, Lincoln NE, November 7, 2003.
- “New ramification breaks and local, additive Galois structure,” Special Session on Algebraic Number Theory and K-Theory at the AMS Southeastern Sectional Meeting in Baton Rouge, LA, March 14–16, 2003.
- “Galois action on the algebraic integers,” Algebra-Cryptology Seminar. Florida Atlantic University, November 5, 2002.

#### **International Conferences (since 2000).**

- “Galois scaffolding in characteristic  $p$  local extensions,” Canadian Number Theory Association X Meeting, Waterloo, Canada July 13-18, 2008.
- “On ramification in nonabelian extensions,” XXV Journées Arithmétiques, Edinburgh, Scotland July 2–6, 2007.
- “Galois module structure in elementary abelian local number field extensions,” Canadian Number Theory Association IX Meeting, Vancouver, Canada July 9-14, 2006.
- “On ramification in wildly ramified extensions of local fields,” XXIV Journées Arithmétiques, Marseilles, France July 4–8, 2005.
- “On the necessity of new ramification breaks,” Canadian Number Theory Association VIII Meeting, Toronto, Canada June 20–25, 2004.
- “Additive Galois structure and new ramification breaks,” XXIIIrd Journées Arithmétiques, Graz, Austria July 6–12, 2003.
- “Galois structure of ideals in local, wildly ramified extensions,” International Algebraic Conference dedicated to the memory of Z. I. Borevich, St. Petersburg, Russia September 17–23, 2002.
- “Twists and Galois structure in bicyclic extensions,” Canadian Number Theory Association VII Meeting, Montreal, Canada May 19–25, 2002.
- “Wild extensions, tame group rings and a twist,” Galois Modules in Arithmetic Geometry (GaMAG), Lille, France July 9–13, 2001.
- “Galois structure of the integers in cyclic extensions of local number fields,” XXIIèmes Journées Arithmétiques, Lille, France July 2–6, 2001.
- “Ideals in wild extensions over tame group rings,” Millennial Conference on Number Theory, Urbana, IL, USA May 21–26, 2000

### Professional Memberships.

American Mathematical Society  
Association for Women in Mathematics  
Mathematical Association of America  
Phi Beta Kappa

### Undergraduate Research Activities.

- (1) **Virginia Tech Undergraduate Research Workshop.** Worked with Dan Farkas and Peter Haskell on this NSA funded workshop. May 22-26, 2006. This led to Rob Tompkins' research paper mentioned below.
- (2) **Intensive Summer in Number Theory – UNO.** During each of the summers: 2002, 2003, 2004; I recruited 2-4 strong students to participate in a “transition to research” experience. I found local (UNO) funding to send these students to Math-Fest (Burlington VT, Boulder CO, Providence RI). This resulted in undergraduate research projects during 02/03, 03/04, 04/05 funded by NSF grant DMS-0201080; REU participation; Eric Manley's research paper mentioned below; and an increase in the number of undergraduate students taking upper level mathematics coursework.

### Undergraduate Research Outcomes.

- (1) Rob Tompkins, *Latin Square Thue-Morse Sequences are Overlap-Free*, Discrete Math. Theor. Comput. Sci., **9** (2007), no. 1, 239-246. (Virginia Tech Undergraduate). 2007 winner of the John C. and Elsie M. Layman Prize for Undergraduate Research in Mathematics
- (2) Eric D. Manley, *On quadratic solutions of  $x^4 + py^4 = z^4$* , Rocky Mountain J. Math., **36** (2006), no. 3, 1027–1031. (UNO Undergraduate)

**Extra-Curricular Activities.** These activities did not exist when I arrived at UNO.

- **Math Club.** In 1998, I started this group with another faculty member. In Spring 2000, it was officially recognized as a UNO Student Organization. In May 2001, it became an MAA student chapter (#14-004).
- **Putnam Study Group.** In the Fall of 1999, I recruited students and UNO offered the Putnam Exam for the first time. In December of 2002, one student earned honorable mention. In December of 2003, 14 students took the exam.
- **Problem of the Week.** In the Fall of 2000, I started this activity with another faculty member. By Spring of 2005, it involved about half of the UNO math faculty.
- **Extrema: Extreme Calculus.** In F01, S02, F03, I offered a parallel session of “extreme” Calculus to students in my Calc II class: challenging problems and theoretical underpinnings. One result: an Art Ed major switched to Math, did a research project with me 2003/2004, and enrolled in the PhD program at the University of Kansas in Fall 2004. This activity has grown into Honors Calculus, mentioned below.

## Curriculum Development.

- **Introduction to Abstract Mathematics.** Designed this course at UNO with two other faculty members in 1996. Introduced it into the Curriculum in 1997.
- **Number Theory & Cryptography.** In response to a request by the Department of Computer Science UNO, I designed this course in the Summer of 2000 to be part of the course offerings of the Nebraska University Consortium on Information Assurance (NUCIA). Introduced the course in Spring 2002.
- **Dual Enrollment.** During 2003/2004, I worked closely with another UNO faculty member to design a sustainable concurrent enrollment program for the Mathematics Department (UNO Calculus taught in local high-schools). Visited Portland State University's Challenge Program in Spring 2004.
- **Honors in Mathematics.** During 2007/2008, I was the Coordinator for Honors Calculus and developed a model based upon parallel sessions and additional more rigorous assignments. During 2008/2009, I plan to extend this model to our sophomore level mathematics courses.

## Education Grant Proposals.

National Science Foundation (Submitted 03/30/02: Unfunded)

*MSP: Teaching and Learning of Mathematics and Science Institute (TALMAS)*, 5 years, \$26,561,283. I was member of the team (Arts & Science and Education Faculty – UNO) that wrote this proposal for a partnership between the Omaha Public Schools and the University of Nebraska at Omaha.

## Courses Taught.

VT.

- **Applied Combinatorics.** Used *Discrete Mathematics* by Dossey *et. al.* Fall 2005, Spring 2006, Fall 2006.
- **Calculus.**
  - **Multivariable Calculus** Used *Calculus* by Stewart. Fall 2005.
- **Introduction to Proofs.** Used *Introduction to Mathematical Proofs* by J. Arnold. Fall 2006, Spring 2007.
- **Modern Algebra.** Used *Modern Algebra* by J. Durbin. Spring 2006, Spring 2007.

UNO.

- **Abstract Algebra I & II.** Used *Contemporary Abstract Algebra* by J. Gallian in Fall/Spring in 1996/1997, 1998/1999, 2000/2001 and 2004/2005.
- **Calculus.**
  - **Honors Coordinator.** 2007/2008
  - **Calculus II.** Fall 1995, Spring 1996, Fall 2001, Spring 2002, Fall 2003, Spring 2008.
  - **Business Calculus.** Fall 1996, Fall 1998, Fall 2000

- **Geometry** (for prospective high school teachers). Used *Euclidean & Non-Euclidean Geometry* by M. Greenberg in Fall 1997.
- **Introduction to Abstract Mathematics**. Used *Sets, Functions and Logic* by K. Devlin in Fall 2004. Used *Introduction to Advanced Mathematics* by W. Barnier and N. Feldman in Spring 1998, Spring 1999, Fall 1999, Spring 2000, Fall 2003.
- **Modern Algebra** (for prospective high school teachers). Except for first year, used *Introductory Modern Algebra* by S. Stahl each Fall from 1995 to 2002. Also Summer 1998.
- **Number Theory & Cryptography**. Used *Elementary Number Theory* by K. Rosen each Spring 1996 – 2003. Also Summer 1999, and will again in Spring 2005. This course evolved out of **Theory of Numbers**.
- **Pre-Calculus**.
  - **Intermediate Algebra**. Spring 1997.
  - **College Algebra**. Summer 1997, Summer 1998.
  - **Trigonometry**. Summer 1997.

OSU.

- **Algebra**. Used *A Book of Algebra* by C. Pinter.
- **Discrete Mathematics**. Used *Discrete Mathematics and its applications* by K. Rosen.
- **Geometry**. Used *Euclidean & Non-Euclidean Geometry* by M. Greenberg.

### Service.

VT Department.

- Graduate Teaching Certification Committee. 2006/2007.

UNO Department.

- Chair, Advisory Committee. 2003/2004.
- Recruiting Committee. 1997/1998, 1998/1999, 2002/2003.
  - Chair, Analysis Position Sub-Committee. 1998/1999.
- Chair, Library Committee. 1995/1996, 1996/1997, 1997/1998, 2000/2001, 2003/2004.
- Curriculum Committee. 1995/1996, 1996/1997, 2003/2004, 2004/2005.
  - Chair. 2007/2008.
- Colloquium Coordinator. 1996/1997, 1997/1998.
- Developed Department Website. 1998/1997.

UNO College of Arts & Sciences.

- Educational Policy Committee 2008/2011.
- Reappointment, Promotion and Tenure Committee 2004/2007.
- Technology Fee Committee 2001/2002.

UNO University.

- Faculty Senate. 2000/2001, 2004/2007, 2007/2010.
  - Faculty Personnel and Welfare Committee 2007/2010.

\* Chair. 2008/2009

- Professional Development Committee 2000/2001.
- Constitution and Bylaws Committee 2000/2001.
- Committee on Academic and Curricular Affairs 2004/2007.
- Budget Advisory Committee. 1999/2000.
- Strategic Planning Committee. 2000/2001.

Community.

- Coach, UNO Rugby Team 1996-1998.

Profession.

- Referee.
  - Journal of Number Theory (1 article).
  - Rocky Mountain Journal of Mathematics (3 articles).
- Grant Reviewer.
  - National Science Foundation (1 proposal).