

## Curriculum Vitæ · John Perry

The University of Southern Mississippi  
Department of Mathematics, Box 5045  
Hattiesburg, MS  
[john.perry@usm.edu](mailto:john.perry@usm.edu)  
[www.math.usm.edu/perry/](http://www.math.usm.edu/perry/)

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### 1. BACKGROUND AND OVERVIEW

#### Education.

- Ph.D. Mathematics, [North Carolina State University](#) (Raleigh), 2005  
[Combinatorial Criteria for Gröbner Bases](#) (Hoon Hong, Adviser)
- M.S. Mathematics, [Northern Arizona University](#) (Flagstaff), 1995
- B.S. Mathematics and Math Education, [Marymount University](#) (Arlington, VA), 1993
- For the sake of enrichment and research, I have taken additional graduate courses in Computer Science.

#### Recent appointments.

- 2011–Present Associate Professor, [University of Southern Mississippi](#)
- 2011–2012 Consultant, Test Development Program, [Excelsior College](#)
- 2006–2011 Assistant Professor, [University of Southern Mississippi](#)
- Various Reader ([AP Calculus Exam](#)), Educational Testing Service, Inc.  
(2007, 2008, 2010, 2012, 2013)
- 2005 (Summer) Question Writer, Advanced Instructional Systems, Inc. ([WebAssign](#))
- 2005–2006 Assistant Professor, [North Carolina Wesleyan College](#)

#### Overview.

*Teaching experience:* More than twenty years' experience as professor, adjunct, and graduate teaching assistant. Topics include mathematics at all levels, as well as my research field. Received the [2017 Distinguished Teaching Award](#) for the Louisiana/Mississippi Section of the Mathematical Association of America.

*Refereed publications:* Eleven research articles in ranked, indexed, international journals or proceedings. The [SINGULAR](#) manual cites two; from 2014–2016 the *Journal of Symbolic Computation* listed two among its [top cited](#). Three of five talks at the [ISSAC 2017](#) session on Gröbner Basis computation cited previous work.

*Invited talks:* Nine, from research universities to high schools.

*Student research:* Ten research projects for students at USM, including three undergraduate Honors Theses and two Master's theses. Master's students won first prize in consecutive years at the regional MAA meeting.

*Collaborations:* I have collaborated with mathematicians and scientists at the University of Pisa, the University of Kaiserslautern, the Max Planck Institute, and a Microsoft employee.

*Software:* Implementations of algorithms designed by myself and/or others are available online. Contributions to the Sage computer algebra system in computational computation algebra, linear programming, others.

*Grant activity:* Three internal awards for improvement of instruction, one external award for student participation at a conference, one external award to support a graduate student.

## 2. SCHOLARSHIP

*Research Interests:* Computational algebra, with a special emphasis on the computation of Gröbner bases.

**Publications.**

*Original research in refereed journals or conference proceedings:*

- J. Perry, “A Dynamic F4 algorithm,” *Applicable Algebra in Engineering, Communication, and Computing*, vol. 31 (2020) combined issue 5-6 pp. 411-434.
- J. Perry, “Exploring the Dynamic Buchberger Algorithm,” *Proceedings of the 42nd International Symposium on Symbolic and Algebraic Computation*, ACM Press (2017), pp. 365–372.
- H. Dozier and J. Perry (lead author), “Androids Armed with Poisoned Chocolate Squares: Ideal Nim and Its Relatives,” *Mathematics Magazine*, vol. 89 (2016) pp. 235–250.
- M. Caboara and J. Perry (lead author), “Reducing the size and number of linear programs in a dynamic Gröbner basis,” *Applicable Algebra in Engineering, Communication, and Computing*, vol. 25 (2014) issue 1 pp. 99–117.
- C. Eder and J. Perry (lead author), “Signature-based algorithms to compute Gröbner bases,” *Proceedings of the 36th International Symposium on Symbolic and Algebraic Computation*, ACM Press (2011), pp. 99–106.
- A. Arri (lead author) and J. Perry, “The F5 Criterion Revised,” *Journal of Symbolic Computation* vol. 46 (2011), pp. 1017–1029.
- C. Eder (lead author), J. Gash, and J. Perry, “Modifying Faugère’s F5 Algorithm to ensure termination,” *ACM Communications in Computer Algebra*, Issue 176, Vol 45, No. 2 (June 2011), pp. 70–89.
- D. Leggett, J. Perry (lead author), and E. Torrence, “Computing determinants by double-crossing,” *College Math Journal*, Vol. 42 (2011), No. 1, pp. 43–54.
- C. Eder and J. Perry (lead author), “F5C: a variant of Faugère’s F5 algorithm with reduced Gröbner bases,” *Journal of Symbolic Computation* (special issue on the MEGA’09 conference), Vol. 45 (2010), pp. 1442–1458.
- J. Perry, “An extension of Buchberger’s first criterion for Gröbner basis decision,” *London Mathematical Society Journal of Computation and Mathematics*, Vol. 13 (2010), pp. 111–129.
- H. Hong and J. Perry (lead author), “Are Buchberger’s Criteria necessary for the chain condition?” *Journal of Symbolic Computation*, Vol. 42 (2007), pp. 717–732.

*Other publications:*

- Preprints on arxiv
  - M. Albrecht (lead author) and J. Perry, “F4/5”
- Solutions acknowledged in the “Problems” sections of MAA journals
  - J. Perry and A. Sanders (lead author), solutions to *College Math Journal* Problems 866 and 871
- Articles in popular mathematics journals
  - J. Perry, “Book Review: Cows in the Maze and Other Mathematical Explorations”, *MAA Focus*, August/September 2010, p. 28
- Book reviews on *MAA Reviews*
  - *A Singular Introduction to Commutative Algebra*
  - *Introduction to Computational Genomics*
  - *Reenacting Galileo’s Experiments: Rediscovering the Techniques of Seventeenth-Century Science*
  - *Cows in the Maze and Other Mathematical Explorations*
  - *Mathematics for Multimedia*

**Participation in important conferences or workshops.**

2006      *Special semester on Gröbner bases and related methods*  
 Johannes Kepler University, Linz, Austria  
 Organized by RICAM (Radon Institute for Computational and Applied Mathematics) and  
 RISC (Research Institute for Symbolic Computation)

## Software.

- **Agnesi**  
Interactive, open-source graphing calculator embeddable on web pages
- **DynGB**  
Implementations of dynamic algorithms to compute a Gröbner basis, work in progress
- **Completely Unscientific Benchmarks**  
Contributed implementations in Ada, Eiffel, Modula-2, Modula-3, Oberon-07
- An implementation of the F5 algorithm for the SINGULAR computer algebra system, with optimizations that are original to this implementation (see related publication above).  
[www.math.usm.edu/perry/Research/f5\\_library.lib](http://www.math.usm.edu/perry/Research/f5_library.lib)  
[www.math.usm.edu/perry/Research/f5r\\_library.lib](http://www.math.usm.edu/perry/Research/f5r_library.lib)  
[www.math.usm.edu/perry/Research/f5c\\_library.lib](http://www.math.usm.edu/perry/Research/f5c_library.lib)
- An implementation of the F5 algorithm for the Sage computer algebra systems, with optimizations.  
[www.math.usm.edu/perry/Research/f5.py](http://www.math.usm.edu/perry/Research/f5.py)
- An implementation of a generic signature-based algorithm to compute Gröbner bases, which implements several specific algorithms as plugins  
[www.math.usm.edu/perry/Research/basic\\_sigbased\\_gb.py](http://www.math.usm.edu/perry/Research/basic_sigbased_gb.py)
- Several enhancements and bug-fixes of the Sage computer algebra system  
(as of 2016 I had participated in 19 tickets and contributed 8 patches)

## Invited talks.

- 2019      *The dynamic approach to Gröbner basis computation*  
Symbolic Computation Seminar, North Carolina State University
- 2014      *So Macaulay Needed a Diet...*  
Department of Algebra and Mathematical Logic, Kazan Federal University, Russia  
*also*, Computational Mathematics Research Group, Universiteit Antwerpen, Belgium
- 2014      *The Skeletons you find when you Order your Ideal's Closet...*  
Nizhny Novgorod Mathematical Society, Higher School of Economics, Nizhny Novgorod, Russia  
*also*, Centre for Computer Algebra, Universität Kaiserslautern, Germany
- 2013      *"What makes a number 'real'?"*  
Stringer Attendance Center, Stringer, MS
- 2011      *Interactive Calculus + "SAGElets"*  
Sage Education Days 3, University of Washington
- 2009      *Gröbner bases and F5*  
University of Cincinnati, OH
- 2009      *Understanding and Implementing F5*  
Sage Days 12, University of California at San Diego
- 2008      *Understanding and Implementing F5*  
Centre for Computer Algebra, Universität Kaiserslautern, Germany
- 2005      *Combinatorial criteria for Gröbner bases*  
Young Researchers' Session, Applications of Computer Algebra, Nara, Japan

**Other talks (selection).**

2017	<i>A Dynamic Buchberger Algorithm</i> Tulane University, Algebra and Combinatorics Seminar
2016	<i>An Iterative Double Description Method for Integer Constraint Problems</i> Annual meeting of the LA/MS Section of the MAA, LSU Shreveport
2013	<i>“Recent” developments in the computation of Gröbner bases</i> Tulane University, Algebra and Combinatorics Seminar
2013	<i>The Zariski Topology</i> University of Southern Mississippi, Colloquium
2013	<i>Nim<sup>∞</sup></i> University of Southern Mississippi, Colloquium
2012	<i>An effective method to stop the refiner in Caboara’s dynamic algorithm</i> North Carolina State University, Symbolic Computation Seminar
2011	<i>Signature-based algorithms to compute Gröbner bases</i> ISSAC 2011, San Jose
2011	<i>Geometry of Hilbert polynomials and Gröbner bases</i> University of Mississippi, regional MAA meeting
2008	<i>Determinants in Wonderland</i> Western Florida University, regional MAA meeting
2007	<i>From Gauss to Gröbner bases</i> various regional universities
2006	<i>Criteria on leading terms for S-polynomial representations</i> Universität Passau, Germany
2005	<i>Combinatorial criteria for Gröbner bases</i> Moscow State University, Russia

**Grant Awards.**

- *Research Experience Apprenticeship Program* (2021)  
Amount awarded: \$6,000  
Funding agency: United States Army Educational Outreach Program
- *Mississippi Space Grant Consortium Graduate Fellowship* (2019–2020)  
Amount awarded: \$20,000  
Funding agency: Mississippi Space Grant Consortium
- *Summer Grant for the Improvement of Instruction: Mathematical Computation as a Transition to Advanced Mathematics* (2016)  
Co-PIs: John Harris and Karen Kohl  
Amount awarded: \$3,600  
Funding Agency: University of Southern Mississippi Provost’s Office
- *Funds to Support Undergraduate Student Participation*  
Amount awarded: \$1,500  
Funding Agency: Mathematical Association of America  
(Funding for student activities was provided by NSF grant DMS-0846477 through the MAA Regional Undergraduate Mathematics Conferences program, [www.maa.org/RUMC](http://www.maa.org/RUMC).)
- *Summer Grant for the Improvement of Instruction: Development of Online, Interactive Calculus Text and Software* (2008)  
Co-PIs: Joseph Kolibal and Sungwook Lee  
Amount awarded: \$3,237  
Funding Agency: University of Southern Mississippi Provost’s Office
- *Leslie H. and Evelyn G. Garner Leadership Award: Calculus and Maple*  
Co-PI: Carol Lawrence  
Amount awarded: \$3,900  
Funding Agency: North Carolina Wesleyan College

## 3. CLASSROOM INSTRUCTION

**“Overall rating of the instructor” on student evaluations, where 5 is labeled as “Highest”.**

Mean of means: 4.01, standard deviation 0.61      Mean of medians: 4.21, standard deviation 0.65  
Based on 924 student evaluations at current institution, *Fall 2006 through present.*

**Courses taught in last five years.**

Undergraduate: Calculus (for Scientists and Engineers) I, II (Fall 2019, Spring 2020, Fall 2020)

Mathematical Computation (Spring 2017, Spring 2018, Spring 2019)

Linear Programming (Summer 2019)

Modern Algebra I (each Fall 2010–2020, each Spring 2020-)

Modern Algebra II (each Spring 2011–2013)

Number Theory (Spring 2017, Spring 2019)

Graduate: Advanced Number Theory

Computational Commutative Algebra I (Fall 2016)

C++ for Mathematicians (Spring 2017)

Introduction to Computational Algebraic Geometry (Fall 2017)

**Have also taught:** Intermediate Algebra, Quantitative Reasoning, College Algebra, Trigonometry, Precalculus, Elementary Statistics, Brief Applied Calculus, Applied Calculus for Engineering Technology I, Honors Calculus I, Honors Calculus II, Linear Algebra, Differential Equations, Topics in Algebra: Algebraic Computation, Topics in Algebra: Algebraic Biology, Topics in Algebra: Galois Theory, Mathematical Culture, Modern Algebra, Coding Theory, Cryptology, Combinatorial Games, and Computational Algebra

**Middle and Secondary School.**

- *Secrets and Codes*, Karnes Center for Gifted Studies Summer Outreach Program, Summer 2018
- Department of Mathematics, Franklin County High School in Virginia from 1995–1997.

**Innovations in teaching.**

- **C++ for Mathematicians (Spring 2017)**  
A graduate-level course that (re-)introduced mathematics graduate students to C++ programming techniques, with the aim of preparing them in one semester to take a Computer Science course in Data Structures.
- **Mathematical Culture (Summer 2012)**  
Important, surprising mathematics, targeted at high school teachers. Material based on “popular” mathematics textbooks written by well-known, award-winning, and/or highly recommended authors, included the Banach-Tarski hypothesis, Chaos Theory, Recreational Mathematics, and the Riemann Hypothesis.
- **Honors Calculus Seminar (Spring 2010).**  
Members of the mathematics department answer the question, “*What do mathematicians do for research?*” This seminar, scheduled during meetings of Honors Calculus class, addressed Honors students’ need to receive exposure to the research conducted by mathematics faculty.
- **Mathematical Computation with Sage (Fall 2009, ongoing).**  
Our majors take MAT 305, Mathematical Computing. In Fall 2009 I revised the course for a different computer algebra system. Two colleagues have authored an open textbook for the material, which is also used at Xavier University of New Orleans, and is available online at [www.math.usm.edu/dont\\_panic/](http://www.math.usm.edu/dont_panic/)
- **Interactive Worksheets for Calculus I (Summer 2008).**  
Lessons, worksheets, and labs to supplement traditional Calculus instruction with interactive lessons, worksheets and labs using a computer algebra system. Listed on the Sage library.
- **Honors Calc field trip to NASA Stennis (Spring 2008, Spring 2009).**

**Teaching awards.**

- 2017 Distinguished Teaching Award, Mathematical Association of America, Louisiana/Mississippi Section

## 4. STUDENT RESEARCH

**Student awards.**

- Candice Mitchell, 2017–2019: Mississippi Space Grant Consortium Fellowship. (In Fall 2019, the university's accounting for this grant was changed to credit the advisor as well as the student.)
- Haley Dozier, Spring 2014: Eagle SPUR research grant.
- Deanna Leggett, Spring 2011: First prize, student paper competition, graduate category, annual meeting of the LA-MS Section of the MAA.
- Miao Yu, Spring 2010: First prize, student paper competition, graduate category, annual meeting of the LA-MS Section of the MAA.

**Graduate research students.**

- Candice Mitchell. *A Dynamic F5 Algorithm*. Doctor of Philosophy, May 2020.
- Deanna Leggett: *Fraction-free methods for determinants*. Master's Degree, May 2011.
- Miao Yu: *An F4-style algorithm to compute involutive bases of polynomial ideals*. Master's Degree, August 2010.

**Undergraduate research students.**

- Haley Dozier: *Ideal Nim*. Undergraduate Research, August 2013–December 2014.
- Lorrin Debenport: *Sparse Matrix Reduction with Fixed Columns*. Honors thesis, May 2011.
- Elisabeth Palchak: *Identifying Stressors in Nonlinear Equations Using Gröbner Bases*. Honors thesis, May 2010.
- Matthew Dixon: *Tropical Geometry*. Undergraduate research, Fall 2010.
- Ashley Sanders: *Problems and Solutions*. Undergraduate research, Spring–Fall 2008.
- Deanna Leggett: *Understanding and modifying Dodgson's Method to compute determinants*. Undergraduate research experience, Spring 2008.
- Courtney Bright: *Curriculum, methods, and assessment strategies in different countries*. Honors thesis, 2007–2008.
- Jonathan O'Rourke: *Universal Algebra*. Undergraduate research, Spring 2007 (with Dr. Sungwook Lee).

## 5. SERVICE

**Professional service.**

2020	Classroom Environment Committee, USM <i>Committee charged with advising on classroom needs during Fall 2020 of the Coronavirus pandemic</i>
2017–2019	Academic Council <i>Subcommittees: Program Review Committee, Academic Standards Committee</i>
2018–Present	Program Lead / Undergraduate Program Coordinator / . . . , Mathematics BS
2012–2019	Local organizer, American Mathematics Competitions <i>This involves not only organizing local hosting of Competitions 8, 10, and 12. Every year I visit several schools to present information about the test and review problems and how to solve them.</i>
2011–Present	Department webmaster
2011–Present	Reviewer, <i>Zentralblatt Math</i> (>20 contributions as of 2021)
2009–Present	Developer, Sage computer algebra system
2007–Present	Departmental committees, library liaison
2012–2018	Undergraduate program coordinator
2015	Mathematical Games (course taught at <a href="#">Osher Lifelong Learning Institute</a> )
2013–2014	Outgoing program chair, LA/MS Section of the Mathematical Association of America
2012–2013	Section Chair, LA/MS Section of the Mathematical Association of America
2012–2014	Chair, Department Tenure and Promotion Committee
2011–2012	Mississippi Vice-Chair, LA/MS Section of the Mathematical Association of America
2011	Departmental graduate committee
2010–2011	Departmental curriculum reform committee
2010–2012	Scholarship Committee, College of Science and Technology
2009	Judge, Mississippi High School Science Fair competition
2008–2009	Committee to evaluate Summer Grants for the Improvement of Instruction
2007	Local co-host (with Haiyan Tian), American Mathematics Competition
2007, 2011	Judge, MAA Undergraduate Poster Session at the 2007 Joint Meeting of the AMS and MAA
Spring 2007	Math Zone tutor

Referee: (sorted alphabetically, then for conferences by year)

- *Applicable Algebra in Engineering, Communication, and Computing* (2013, 2014, 2020), two articles
- *Asian Symposium on Computer Mathematics* (various years), two articles and one poster
- *Association for Women in Mathematics Research Symposium*, one article
- *Communications in Computer Algebra* (2019), one article
- *College Math Journal* (2011), one article
- *Filomat*, one article
- *International Chaos Theory Workshop* (various years), thirty papers (with Jiu Ding)
- *ISSAC 2019*, one article
- *ISSAC 2017*, two articles
- *ISSAC 2015*, one article
- *ISSAC 2014*, one article
- *ISSAC 2012*, one article
- *ISSAC 2011*, three articles
- *ISSAC 2010*, one article
- *ISSAC 2008*, one poster
- *Journal of Symbolic Computation* (various years), multiple articles
- *Matematicheskii Sbornik* (2020), one article
- *SNC 2014*, one article
- *SODA 2010*, one article
- Springer's *Theoretical Computer Science*, special issue on Symbolic-Numeric Computation, one article

**Professional Societies.**

2019–Present Society of Catholic Scientists  
2008–Present Mathematical Association of America (specifically, the Louisiana/Mississippi Section)  
2004–Present ACM Special Interest Group on Symbolic and Algebraic Manipulation (SIGSAM)  
2012–2013 Association for Computing Machinery (ACM)  
1999–2008 American Mathematical Society

**Community Service.**

2016–Present Lector, St. Thomas Aquinas Church, Hattiesburg MS  
2017–2018 Faculty adviser, *Eagles for Life*  
2016–2017 Sunday School instructor, St. Thomas Aquinas Church, Hattiesburg MS  
2014 Volunteer tutor, Sacred Heart Church, Hattiesburg MS  
2009–2010 Booster Club, Sacred Heart School, Hattiesburg MS  
2009–2010 Saint Vincent DePaul Society  
2008–2010 Dads' Club, Sacred Heart School, Hattiesburg MS  
2007–2015 Lector, Sacred Heart Church, Hattiesburg MS