ANDREW T. PARKER

Mobile: (410) 903-0000
andrew.parker@principia.edu

3513 Stanka Ln
Godfrey, IL 62035

EDUCATION

MS, PhD, Mathematics—University of New Hampshire, Durham, NH, September 1999.
- Doctoral minor in Spatial Statistics

BS, Mathematics—Principia College, Elsah, Illinois, June 1992
- Minors in physics and music; member, Sigma Pi Sigma

CURRENT POSITION

7/2023-present, **PROFESSOR, PRINCIPIA COLLEGE**
7/2012-6/2023, **ASSOCIATE PROFESSOR, PRINCIPIA COLLEGE**
8/2008-6/2012, **ASSISTANT PROFESSOR, PRINCIPIA COLLEGE**

10/2011-8/2013, 07/2020-present: Chair, Mathematics Department
07/2020-02/2022, 07/2024-present: Division Head, Mathematics and Natural Sciences Division
08/2019-06/2020: Chair, Computer Science Department (acting)

- Duties include: teaching a wide range of mathematics courses from advanced major down through developmental; advising both new students and mathematics majors; advising student research projects resulting in student presentations delivered at regional conferences; serving on campus-wide committees; engaging in professional activities.
- Committees and service: Academic Division Head (Math and Natural Sciences); Academy Assessment Team (appointed); Faculty Council (elected); Curriculum Committee; Committee on Committees; Admissions Committee; various search committees; assessment coordinator for mathematics department.
- As a member of the Academy Team, established systems and processes for assessment of student learning, drafted the assurance argument for the reaffirmation of Principia's accreditation, and led the campus community through the reaffirmation process.

COURSES TAUGHT

- **MATH099 Basic Math Tutorial**: A two-hour per week, non-credit guided tutorial for students who are not prepared to take a 100-level college course in mathematics.
- **MATH110 Mathematical Applications**: Applications of elementary mathematics in the fields of finance, economics, statistics, physical and life sciences, and business.
- **MATH141 College Algebra**: Topics include the theory of solving polynomial equations; solving simultaneous linear equations; graphs and properties of polynomial functions, rational functions, exponential functions, logarithmic functions, and conic sections; and mathematical induction and the general binomial expansion.
- **MATH143 Precalculus**: Investigates properties of functions, techniques for solving equations and inequalities and graphing. Emphasizes polynomial, rational, algebraic, exponential, logarithmic, and circular functions as well as conic sections.
- **MATH164 Introduction to Statistics**: Descriptive statistics including measures of central tendency, measures of dispersion, correlation and regression; basic concepts of probability; inferential statistics including estimation and hypothesis testing. Applications in biological and social sciences.
- **MATH181 Calculus I**: First semester of single-variable calculus. Includes a review of properties of elementary functions, limits, derivatives, applications of derivatives, continuity, the definite integral, basic antiderivative formulas, the Mean Value Theorem, and the Fundamental Theorem of Calculus.
- **MATH182 Calculus II**: Second semester of single-variable calculus. Includes a review of Calculus I, techniques of integration, applications of the definite integral, an introduction to differential equations,

parametric equations, polar coordinates, and the theory of infinite sequences and series, including tests for convergence and Taylor Series.

- **MATH211 History of Mathematics**: A concise history of mathematics. Includes topics from mathematics in early civilizations, Greek mathematics from classical, first Alexandrian, and second Alexandrian periods, Hindu and Arabic contributions, European Renaissance, the calculus controversy, non-Euclidean geometry, the rise of analysis, Gödel's Incompleteness Theorem, and the loss of certainty.
- **MATH220 Mathematical Proofs**: Investigates the nature and structure of mathematical proofs found in calculus, algebra, and geometry. Includes set theoretic foundations, the rules of propositional logic, the principle of mathematical induction, and the nature of deductive reasoning. Analyzes various proofs from geometry, algebra, and calculus as well as provides students with practice in constructing such proofs.
- **MATH283 Multivariable Calculus**: Vector algebra and vector calculus. Partial differentiation. Directional derivatives. Multiple integrals. Line and surface integrals. Applications.
- **MATH261 Discrete Math**: Nature of proof, sets, graph theory, logic, Boolean algebra, functions and relations. Required for computer science majors.
- **MATH273 Linear Algebra**: Vector spaces, vector and matrix operations, determinants, linear transformations, systems of linear equations, change of basis, eigenvalues.
- **MATH284 Differential Equations**: Linear differential equations, Laplace transform methods, series solutions, numerical solutions, introduction to partial differential equation, applications.
- **MATH355 Applied Advanced Calculus**: Introduction to vector analysis: vector differential calculus, integral theorems, curvilinear coordinates. Fourier analysis: Fourier series and integrals, orthogonal functions, applications in boundary value problems.
- **MATH360 Numerical Analysis**: Theory and techniques for obtaining numerical solutions. Numerical methods are implemented by using computers. Topics include: root-finding; interpolation; approximation of functions; numerical integration; differential and difference equations, applications in linear algebra; and error analysis.
- **MATH364 Mathematical Statistics**: Probability, random variables, probability distributions, mathematical expectation, moments, moment generating functions, sampling distributions, Central Limit Theorem, estimation and hypothesis testing, correlation, curvilinear and multiple regression.
- **MATH370 General Topology**: Introductory point-set topology. Topological spaces, open and closed sets, bases, interior, closure, limit points and boundary of subsets, metric spaces, continuous functions, homeomorphisms, connectedness and compactness, as well as some applications. Taught using inquiry-based learning methods.
- **MATH374 Algebraic Structures**: Group theory, Boolean algebra, rings, integral domains and fields.
- **MATH415 Senior Capstone**: Synthesizes and extends material from courses in the major using topics such as integration, linearity, optimization, periodicity, and expansions. Includes a writing assignment that fulfills phase six of the all college writing requirement.
- **MATH421 Math Seminar**: A seminar in selected topics in mathematics. Topics taught: mathematics of telecommunications, cryptography, topology, fractals.
- **MATH431 Complex Variables**: Analytical functions, Cauchy's theorem, Taylor and Laurent series, residues, contour integration, integral transforms, conformal mapping.

PRIOR POSITIONS

9/2000-8/2008, **NATIONAL SECURITY AGENCY**

- 9/2004-8/2008, **Hardware-Software Design Engineer:** Selected for the Resident Signals Engineer development program, a program designed to accelerate professional development and technical achievement through tours in diverse organizations and field experiences.
  - 6/2006-8/2007: Field assignment to NSA/CSS Hawaii. Coordinated efforts across government and corporate organizations to improve US communications security for customers in the Pacific Theater. Consulted with customers, provided monthly status reports and briefings.
  - 9/2004-5/2006: Two office rotations and a ten-week field assignment designed to increase diversity of experience, obtain hands-on experience with RF systems, and gain a clearer understanding of daily operations at NSA. Developed algorithms and GUIs and tested systems in operational environments.

- 9/2003-8/2004, **Applied Research Mathematician**: Coordinated final stages of the development of a force protection product; supported customer's developmental and operational testing phases; collaborated with contractor engineers to identify and resolve system operation problems revealed during tests; conducted user-training session; wrote and distributed user training guide; final product far exceeded customer's expectations and outperformed a competing private industry product in tests. Managed a team of researchers from various agencies across the Intelligence Community (IC) towards technical and algorithmic improvements for another successful product; developed test plans and supervised the scientific collection of data for future research; organized several off-site technical meetings attended by all interested parties within the IC to exchange ideas and review progress. Participated in other inter-agency meetings regarding continued support for this project. Contributed mathematical support when needed, programmed a data analysis GUI and incorporated the core algorithm developed by the team. System and software went on to achieve unprecedented success in the field.

- 9/2000-8/2003, **Applied Mathematician Program**: Entered and graduated from a training program for applied mathematicians consisting of rotation through diverse organizations, completion of periodic intense four- to six-week courses in relevant mathematics, and development of solutions towards achieving host organizations' missions. Programmed successful software solutions in C and MATLAB. Published internal technical papers and presented results in colloquia and at technical conferences.

8/1999-8/2000, **ASSISTANT PROFESSOR, SUNY FREDONIA, FREDONIA NY**

- Department of Mathematics and Computer Science: Tenure-track position. Successful annual tenure progress review resulting in contract renewal for the following cycle (2000-2001 academic year).
- Successful grant proposal for funding for a summer faculty workshop delivered in 2000 to develop Interdisciplinary Lively Application Projects (ILAPs) for use in mathematics curriculum.

8/1996-8/1999, **RESEARCH ASSISTANT, MATHEMATICS DEPT., UNIVERSITY OF NEW HAMPSHIRE**

- Investigated security properties of several recently proposed chaotic communication schemes using nonlinear dynamic (NLD) forecasting techniques. Developed a binary communication scheme which thwarts the NLD attack. Funded by a grant from the Center for Research on Applied Signal Processing at USC (Contract No. 012132, "Signal Detection and Extraction from Chaotic Communication Schemes Using Nonlinear Dynamic Forecasting"). Submitted monthly reports, produced and presented semiannual and annual reviews.

8/1993-8/1996, **TEACHING ASSISTANT, MATHEMATICS DEPT., UNIVERSITY OF NEW HAMPSHIRE**

- Led recitation sections for courses in calculus, differential equations and finite mathematics. Taught a summer course in finite mathematics. Typically had 90 or more students across three sections of a course in any given semester.

HONORS & AWARDS

NSA
Special Achievement Award, June 2007
Department of Defense Joint Meritorious Unit Award (presented to NSA workforce), March 2007
Special Achievement Award, June 2006
Time Off Award, October 2005
Team Achievement Award, September 2002
Team Achievement Award, August 2002

PRINCIPIA Teacher of the Year, 2024

PATENTS

U.S. Patent No. 6363153, "Method and apparatus for secure digital chaotic communication," issued March 26, 2002. International patents applied for in 2006.

PAPERS

R. J. Marchand, R. R. Rogers and A. T. Parker, “Designing a Telescope Mirror for Second-Semester Calculus Students,” Mathematics and Computer Education, Vol. 40, No. 2, Spring 2006.

Andrew T. Parker and K.M. Short, “Reconstructing the keystream from a chaotic encryption scheme,” IEEE Transactions On Circuits And Systems—I: Fundamental Theory and Applications, Vol. 48, No. 5, May 2001. **Cited by 111 other publications** (via Google Scholar).

Andrew T. Parker and K.M. Short, “An impulsively initialized, digital chaotic communication scheme,” presented at the 1999 Joint Mathematics Meetings, San Antonio, TX, January 1999.

K. M. Short and Andrew T. Parker, “Nonlinear Dynamic Analysis of Industrial Equipment Vibrations,” paper presented at SIAM Northeast Regional Mathematics in Industry Workshop, Worcester, MA, May 1998.

K. M. Short and Andrew T. Parker, “Unmasking a hyperchaotic communication scheme,” *Phys. Review **E,*** 58, pp. 1159-1162, July 1998. **Cited by 191 other publications** (via Google Scholar).

Three classified research papers and technical reports published internally at NSA, 2001-2008.

PRESENTATIONS

A. Parker et al., "Integrating Outcome-Based Assessment of Student Learning into Program Review", delivered at the Academy Learning Exchange at the Higher Learning Commission Annual Conference, April 2013.

Andrew T. Parker, Invited Address: "Codes and Chaos," delivered at the Show Me Math Undergraduate Conference, Southeast Missouri State University, 14 November 2009.

Andrew T. Parker, "Communicating with Chaos," delivered at the MAA Seaway Sectional Meeting, Adirondack Community College, 6 November 1999.

Andrew T. Parker and K.M. Short, “An impulsively initialized, digital chaotic communication scheme,” presented at the 1999 Joint Mathematics Meetings, San Antonio, TX, January 1999.

Andrew T. Parker and K. M. Short, “Nonlinear Dynamic Analysis of Industrial Equipment Vibrations,” paper presented at SIAM Northeast Regional Mathematics in Industry Workshop, Worcester, MA, May 1998.

Many other classified presentations and briefings given at NSA colloquia and technical conferences.

INTERESTS

Bird watching, hiking with family, space exploration, running, tennis, mathematics education, classical music, Ted Drewes Frozen Custard.