

# Christopher J. Swierczewski

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# Résumé

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## Summary of Qualifications

- **Mathematics:** complex algebraic geometry, numerical analysis, partial differential equations, computational geometry, and computer algebra systems.
- **Programming:** C/C++, Python, Cython, Git, object-oriented design, software architecture, test-driven development, Matlab, and some functional programming.
- Focus on high performance algebraic-numerical software design and implementation. Experience with parallel environments through CUDA-based GPU development.
- Effective in-person and remote (via Git/Github) collaborator. Experience in pair-programming environment and with code review processes.
- Detail-oriented problem solver. Committed to investigating optimal solution techniques to mathematical and computational problems.

## Education

- **Ph.D. in Applied Mathematics**, University of Washington, Seattle, Expected December 2015  
Advisor: Bernard Deconinck
  - Design and implementation of algebraic-numerical hybrid tools for computing with Abelian functions and Riemann surfaces in a Python-based open-source mathematical software package, “abel-functions”.
  - Applying research results to computing periodic solutions to a large class of nonlinear partial differential equations using techniques from algebraic geometry.
  - Focus on designing high performance code in both computer algebraic and numerical aspects of the software package.
  - Advised two undergraduate students in related projects on quickly and accurately computing Riemann theta functions.
- **M.S. in Applied Mathematics**, University of Washington, Seattle, June 2010  
Thesis: *A Python Implementation of Chebyshev Functions*
- **B.S. in Mathematics (Comprehensive) with Distinction**, University of Washington, Seattle, June 2008  
Thesis: *Connections Between the Sato-Tate Conjecture and the Generalized Riemann Hypothesis*  
Advisor: William Stein
  - Researched number theoretic and computational problems with William Stein and Barry Mazur in an attempt to prove an extended form of the Sato-Tate Conjecture
  - Results published in AMS Bulletin v.45 no.2 (Fall 2007 - Spring 2008)

## Professional Experience

- **Research Mathematician**, Institute for Defense Analysis: Center for Communications Research, La Jolla, CA. June – August 2012

- **Software Developer**, Simulab Corporation, Seattle, WA. January 2009 – March 2009.
  - Researched theory and applications of Hidden Markov Models to problems in control theory.
  - Implemented Hidden Markov Model C/C++ library, GHMM, in the EDGE project: a surgical trainer for evaluating surgeon performance.
- **Sage: Mathematics Software Developer**, Department of Mathematics, University of Washington, Seattle, WA. September 2007 – September 2008.
  - Designed new Sage finance module around the Opentick financial data acquisition API. Devised methods of wrapping asynchronous functions in a synchronous environment.
  - Designed tests and wrote documentation for mathematical functions in Python, Cython, and C/C++ under a UNIX environment.
- **Applied Research Mathematician**, National Security Agency, Ft. Meade, MD. June – August 2007.
  - Applied algebraic, probabilistic, and statistical methods to improve cryptanalytic attacks against telecommunication encryption standards.
  - Collaborated with mathematicians in researching cryptographic algorithm weaknesses. Implemented algorithms in C.
- **Teaching Assistant and Math Camp Counselor**, Department of Mathematics, University of Washington, Seattle, WA. June – August 2005 and 2006.

## Teaching Experience

- **Instructor**, University of Washington, Seattle:
 

- AMATH 301:	Beginning Scientific Computing	Summer 2014
- AMATH 301:	Beginning Scientific Computing	Summer 2011
- **Teaching Assistant**, University of Washington, Seattle:
 

- AMATH 301:	Beginning Scientific Computing	Winter 2015
- AMATH 351:	Introduction to Differential Equations and Applications	Autumn 2014
- AMATH 301:	Beginning Scientific Computing	Winter 2011
- AMATH 301:	Beginning Scientific Computing	Autumn 2010
- MATH 125:	Calculus with Analytic Geometry II	Spring 2010
- MATH 124:	Calculus with Analytic Geometry I	Winter 2010

AMATH 301 – An undergraduate course in numerical analysis. Computational solutions to linear systems, curve / data fitting, numerical integration and differentiation, solutions to differential equations, and optimization.

AMATH 351 – Standard techniques in solving first and second order equations, series solutions, Laplace transform, systems of linear equations and introductory linear analysis, systems of nonlinear equations and perturbation theory.

## Awards

- Student Chapter Certificate of Recognition, Society for Industrial and Applied Mathematics (SIAM), June 2014.
- Boeing Service Award, University of Washington, Applied Mathematics, June 2013.
- American Mathematical Society Sectional Meeting Travel Grant, October 2011.
- University of Alaska Fairbanks Travel Grant, January 2011.