

# Nathan K. Pflueger

## Contact

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## Professional Positions

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- **Amherst College** 7/2017-present
  - Assistant Professor of Mathematics
- **Brown University** 9/2014-6/2017
  - Tamarkin Assistant Professor of Mathematics.

## Research interests

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- Algebraic geometry, particularly algebraic curves.
- Young tableaux and applications in Brill-Noether theory.
- Tropical curves and linear series.

## Education

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- **Harvard University** 9/2009-5/2014  
Cambridge, MA
  - Ph.D. in Mathematics, May 2014.
  - Adviser: Joe Harris.
  - Thesis: *Regeneration of elliptic chains with exceptional linear series.*
- **Stanford University** 9/2005-6/2009  
Stanford, CA
  - B.S. Mathematics with Honors and Minor in Computer Science, June 2009.
  - J. E. Wallace Sterling Award (for top 25 graduating students in Humanities and Sciences).
  - Spent Autumn 2007 in Hungary at Budapest Semesters in Mathematics.

## Papers

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- *The Gieseker-Petri theorem and imposed ramification* (with M. Chan and B. Osserman). Submitted.
- *Euler characteristics of Brill-Noether varieties* (with M. Chan). Submitted.
- *Weierstrass semigroups on Castelnuovo curves*. Submitted.
- *On non-primitive Weierstrass points*. To appear in Algebra and Number Theory. 2018.
- *Genera of Brill-Noether curves and staircase paths in Young tableaux* (with M. Chan, A. López Martín, and M. Teixidor i Bigas). Trans. Amer. Math. Soc. 370 (2018), 3405-3439 .
- *Brill-Noether varieties of  $k$ -gonal curves*. Advances in Mathematics 312 (2017) 46-63.
- *Special divisors on marked chains of cycles*. Journal of Combinatorial Theory, Series A 150 (2017) 182-207.
- *Bitangents of tropical plane quartic curves* (with M. Baker, Y. Len, R. Morrison, and Q. Ren). Mathematische Zeitschrift 282:3 (2016) 1017-1031.
- *Regeneration of elliptic chains with exceptional linear series*. Ph.D. thesis. 2014.
- *On linear series with negative Brill-Noether number*. Preprint. 2013.
- *Graph reductions, binary rank, and pivots in gene assembly*. Discrete Applied Mathematics 159:17 (2011) 2117-2134.

## Invited talks

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- June 2017, U.C. Irvine number theory seminar.

- March 2017, Brown discrete math seminar.
- February 2017, Valley geometry seminar (at U. Massachusetts).
- May 2016, *Brill-Noether Special Chains of Loops*. Algebraic, Tropical, and Nonarchimedean Analytic Geometry of Moduli Spaces, Oaxaca, Mexico.
- March 2016, Georgia Tech algebraic geometry seminar.
- March 2016, *Chains of cycles and general  $m$ -gonal curves*. Special session in Interactions Between Algebraic and Tropical Geometry, AMS Spring Sectional Meeting, Athens, GA.
- October 2015, Brown algebraic geometry seminar.
- June 2015, *Tableaux in Brill-Noether theory*. Special Session in Enumerative and Combinatorial Methods in Moduli Theory, AMS-EMS-SPM International Meeting, Porto, Portugal.
- October 2014, *Young tableaux and Brill-Noether theory*. Special session on combinatorics and algebraic geometry, AMS Fall Sectional Meeting, San Francisco, CA.
- February 2014, Rice algebraic geometry seminar.
- January 2014, *Towards a tropical Castelnuovo-Severi inequality*. Special session on tropical and non-archimedean geometry, Joint Mathematics Meeting.
- November 2013, Harvard-MIT algebraic geometry seminar.
- November 2013, Brown algebraic geometry seminar.
- October 2013, U. Wisconsin algebraic geometry seminar.
- April 2013, Yale algebraic and tropical geometry seminar.

## Teaching

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- **Amherst College**
  - Fall 2018: Groups, rings, and fields.
  - Fall 2018: Calculus with algebra.
  - Spring 2018: Linear algebra with applications.
  - Spring 2018: Intermediate calculus.
  - Fall 2017: Linear algebra with applications.
  - Fall 2017: Introduction to the calculus.
- **Brown University**
  - Spring 2017: Algebraic Geometry II.
  - Fall 2016: Cryptography.
  - Fall 2016: Algebraic Geometry I.
  - Spring 2016: Algebraic Geometry II.
  - Fall 2015: Cryptography.
  - Spring 2015: Introduction to number theory.
  - Spring 2015: Calculus I.
  - Fall 2014: Calculus II for physics and engineering.
- **Harvard University**
  - Fall 2013: Introduction to Calculus.
    - Wrote comprehensive lecture notes.
  - Spring 2013: Course Assistant for Tropical Geometry.
  - Spring 2012: Teaching Fellow for “Fat Chance” (basic probability course for non-majors).
  - Fall 2011: Math 1B: Integration, Series, and Differential Equations.
    - Wrote comprehensive lecture notes.
- **The Math Circle** (extra-curricular math program for Boston-area children)
  - Spring 2016: taught students ages 13 to 15.
  - Academic year 2013-2014: taught students ages 13 to 18.
  - July 2014 and July 2016: co-organized a math circle teacher training institute in South Bend,

IN.

- Academic year 2012-2013: taught students ages 13 to 18.
- Academic year 2011-2012: taught students ages 7 to 9.

- **Budapest Semesters in Mathematics**

- 2010-2013: Coordinated and coached a team of American students to compete in the International Mathematics Competition for University Students in Blagoevgrad, Bulgaria. Wrote detailed preparation material on the competition problems.

- **Stanford University computer science department**

- Spring 2009: section leader for Programming Abstractions and Methodology (C++).
- Winter 2009: section leader for Programming Abstractions (C++).
- Fall 2008: section leader for Programming Abstractions and Methodology (C++).
- Spring 2008: course helper for Programming Methodology (Java).
- Winter 2008: section leader for Programming Abstractions (C++).
- Spring 2007: section leader for Programming Methodology (Java).

- **Stanford University mathematics department**

- 2006-2009: Tutor for linear algebra and multivariable calculus.
- 2005-2006: Course developer (wrote assignments and exams) for distance learning Calculus C course (through the Education Program for Gifted Youth).

## Service

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- Co-organizer for the Valley Geometry Seminar (2018-present).
- Co-organizer for the Brown algebraic geometry seminar (2014-2017).
- Co-organizer for the Bi-annual Tropical and Algebraic Meetings of Brown and Yale (2014-2017).
- Coach and organizer of a team from Budapest Semesters in Mathematics to the International Mathematics Competition for University students (IMC) in Blagoevgrad, Bulgaria (2010-2014).
- Served as assistant coach for the San Francisco Bay Area team to the ARML mathematics competition (2008,2009).

## Honors and awards

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- NSF Graduate Research Fellowship.
- Certificate of Distinction in Teaching, Harvard University, Spring 2012.
- Barry M. Goldwater Scholarship.
- Putnam Mathematics Competition: 24th place (2008)
- International Mathematics Competition for University Students (Blagoevgrad, Bulgaria): 40th place (2008).
- Google Codejam competition: advanced to semifinal round (top 500 contestants) (2009,2010,2012).
- Boothe Prize for Undergraduate Writing: Finalist (Autumn 2005, Winter 2006), 2nd place (Autumn 2005). Prize selects the best essay written for the freshman Introduction to the Humanities requirement at Stanford.
- Hester-Franklin Prize for best original paper written in first-year French (2009).

## Other employment

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- **University of Minnesota, Duluth** (funding from NSF) Summer 2008,2009,2010  
**R.E.U. in Combinatorics** Duluth, MN
  - 2009: Student participant.
  - 2010 and 2011: Graduate student research adviser.
- **D.E. Shaw and Co.** Summer 2007  
**Quantitative Analyst Intern, Futures Group** New York, NY
  - Researched, implemented, and tested computational methods for correlating high-frequency

financial instruments.

– Developed one chosen method into a versatile set of Java and Perl programs for use in research within the hedge fund.

– Wrote several internal reports detailing the mathematical techniques I investigated.

- **University of Washington** (funding from National Science Foundation) Summer 2006  
**R.E.U. in Inverse Problems for Electrical Networks** Seattle, WA

## **Miscellaneous skills and interests**

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- Substantial programming experience in C++ and Python. Other coding experience: Java, C, Matlab, Perl, Unix, Scheme, PHP, MySQL.
- Basic knowledge of French, intermediate reading knowledge of Latin.
- Recreational cyclist and swimmer; raced at Collegiate National Triathlon Championship in Reno (2006); completed the Seattle to Portland Bicycle Classic in one day (2006, 2008).