# FRANCIS SEUFFERT

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Department of Mathematics

University of Pennsylvania

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# ACADEMIC APPOINTMENTS

# *1. University of Pennsylvania,* Philadelphia, PA, 2020-Present

# Instructor

*2. University of Pennsylvania*, Philadelphia, PA, 2017-2020

Vice Provost Postdoctoral Fellow

Adviser: Ryan Hynd

# EDUCATION

1. *Rutgers University*, Piscataway, NJ, 2010-2016

PhD in Mathematics, 2016

Specialization: Functional Analysis and PDEs.

Thesis Adviser: Eric Carlen.

1. *Stony Brook University*, Stony Brook, NY, 2009-2010
2. *Princeton University*, Princeton, NJ, 2005-2009

A.B. in Mathematics

# PUBLICATIONS

* + - F. Seuffert, *Stability Estimates on $\mathbb{S}^2$: the Onofri Inequality and the Log-HLS Inequality.* In preparation.
    - R. Hynd and F. Seuffert, *Extremals in nonlinear potential theory*, arXiv: 2005.13615, 2020. (Soon to appear in Advances in Calculus of Variations)
    - R. Hynd and F. Seuffert, *Asymptotic flatness of Morrey extremals.* Calculus of Variations and Partial Differential Equations **59**, 5 (2020): 1-24.
    - R. Hynd and F. Seuffert, *On the symmetry and monotonocity of Morrey extremals.* Communications on Pure and Applied Analysis, **19**, 11 (2020), 5285-5303.
    - R. Hynd and F. Seuffert, *Extremal Functions for Morrey’s Inequality*. arXiv: 1810.04393, 2018.
    - F. Seuffert, *A Stability Result for a Family of Sharp Gagliardo-Nirenberg Inequalities.*

arXiv:1610.06869, 2016.

* + - F. Seuffert, *An Extension of the Bianchi-Egnell Stability Estimate to Bakry, Gentil, and Ledoux's Generalization of the Sobolev Inequality to Continuous Dimensions*. Journal of Functional Analysis, **273**, 10 (2017), 3094-3149.

# RESEARCH EXPERIENCE

1. Mathematics Department, University of Pennsylvania

*Vice Provost Postdoctoral Fellow* July 2017 – 2020

Mentor: Ryan Hynd

* + Established existence and qualitative characteristics of extremals of Morrey’s inequality
  + Studied symmetrization methods and their application to analyzing inequalities and PDEs
  + Analyzed elliptic p-Laplace equations

1. Mathematics Department, Rutgers University

*Doctoral Research* August 2010 – June 2016

Research Adviser: Eric Carlen

* Extended Bianchi-Egnell Stability Estimate of the Sobolev Inequality to cylindrically symmetric functions in continuous dimensions
* Established a stability estimate for a family of sharp Gagliardo-Nirenberg Inequalities
* Established Local Bianchi-Egnell type stability estimate for the Onofri Inequality
* Investigated application of stability estimates to nonlinear wave equations

1. Mathematics Department, Princeton University  
   *Undergraduate Summer Research and Senior Thesis* June 2008 – August 2008

Research Adviser: David Gabai

* Classified topological invariants of train tracks on twice-punctured torus

# INVITED TALKS

* *Upcoming:*13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Rome, Italy, June 2022.
* Joint Mathematics Meeting, Held Virtually, January 2021.
* Mathematics Colloquium, St. John’s University, November 2019.
* Geometry/Analysis Seminar, Columbia University, October 2019.
* Mathematical Colloquium, Linkoping University, August 2019.
* Swedish Summer PDEs, KTH Royal Institute of Technology in Stockholm, August 2019.
* Analysis Seminar, The University of Hong Kong, February 2019.
* Geometry-Topology Seminar, University of Pennsylvania, February 2019.
* Fluid Mechanics and Waves Seminar, New Jersey Institute of Technology, April 2018.
* Analysis Seminar, The University of Hong Kong, February 2018.
* Analysis Seminar, University of Pennsylvania, September 2017.

# RESEARCH INTERESTS

* Functional inequalities: approximating sharp constants and classifying extremals
* Use of calculus of variations in establishing stability estimates of sharp inequalities
* Elliptic p-Laplace equations
* Exploring the relationship between the Sobolev Inequality and other inequalities like the Gagliardo-Nirenberg inequalities
* Symmetrization methods and their applications to functional inequalities and PDEs

# TEACHING EXPERIENCE

1. University of Pennsylvania, July 2017 – Present

*Instructor*

* + Calculus I
  + Two sections of approximately 20 students each
  + Responsible for lectures, writing homeworks, quizzes, exams, and office hours
  + Lectures and office hours are held entirely online (as per COVID protocol)

*Instructor*

* + Calculus II
  + Two sections of approximately 130 students each
  + Responsible for lectures, writing homeworks, quizzes, exams, and office hours
  + Lectures and office hours are held entirely online (as per COVID protocol)

*Instructor*

* + Calculus I
  + One section of approximately 45 students
  + Responsible for lectures, writing homework, quizzes, exams, and office hours

*Instructor*

* + Calculus I
  + One section of approximately 130 students
  + Responsible for lectures, writing homework, quizzes, exams, and office hours

1. Yu’s Elite Education, January 2014 – December 2016

*Teacher*

* + Taught elementary and middle school children in a variety of classes
  + Fall 2016, taught six sections: Arithmetic and Geometry, two sections; 8th grade competition Math, two sections; Pre-Algebra, one section; and Algebra and Geometry, one section
  + Classes taught prior to fall 2016: Arithmetic and Geometry; Pre-Algebra; Algebra and Geometry; 8th grade competition Math; and Introduction to Number Theory, Combinatorics, and Geometry
  + Classes varied from five to fifteen students
  + Wrote lesson plans; lectured; wrote and graded homework and exams; and communicated with parents

1. Rutgers University, January 2012 – June 2016

*Teaching Assistant*

* + Calculus II for Mathematical and Physical Sciences
  + Conducted three workshops (25 students each) a week; held office hours
  + Wrote and graded quizzes and homework

*Grader*

* + Advanced Calculus for Engineering
  + Graded homework and exams

*Grader*

* + Introduction to Mathematical Reasoning
  + Graded homework

*Teaching Assistant*

* + Calculus I
* Conducted three recitations (25 students each) a week; held office hours
* Wrote and graded quizzes

1. Bergen Community College, January 2010 – August 2013

*Tutor*

* + Tutored one on one and conducted study groups
  + Tutored all levels of Math from Pre-Algebra to Differential Equations
  + Conducted study groups in Calculus and Statistics with between five and fifteen students
  + Wrote qualifying exam for calculus tutors

1. SUNY Stony Brook, August 2009 – February 2010

*Teaching Assistant*

* + Calculus B
  + Conducted three recitations (25 students each) a week; held office hours

1. Mathnasium, July 2009 – August 2009

*Tutor*

* + Tutored one on one
  + Tutored all levels of Math from Arithmetic to Algebra