

# Daniel M. Kim

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## Overview

Pure mathematics researcher and mathematics educator. Research focuses include Thurston map dynamics, complex and topological dynamics, and discrete conformal geometry. Dedicated and dutiful worker passionate about learning.

## Experience

**Department of Mathematics at Virginia Tech, Mathematics Instructor**

January, 2015 - present

Instructor of record for various math department courses

- Course coordination: Guidance and support role for multivariable calculus instructors; final exam preparation and editing
- Courses taught: Precalculus, Calculus for Life Sciences, Differential Calculus, Integral Calculus, Multivariable Calculus, Linear Algebra
- Course sizes: Ranged roughly from 30 to 50 students per semester for 18 semesters including summer sessions
- Incoming graduate student teaching mentorship: Mentored first-year graduate student in their instructor certification

**Ozmo, Content Developer**

June, 2020 - March 2021

- XML scripting for online device emulation and simulation

**Department of Mathematics at Virginia Tech, Graduate Researcher**

August, 2014 - May 2020

Pure mathematics research in dynamics of Thurston maps and conformal tilings

- Algorithm development: input graph (called dynamic portrait) defining system's action on select points, output concrete system realizing portrait. Tested nascent form of algorithm with hand-calculated examples.
- Developed generalization of core entropy theory and computational algorithm: Thurston's core entropy measures dynamical complexity for specific class of systems and Thurston's entropy algorithm calculates entropy for class members. Used Python computational libraries (numpy, scipy), MATLAB, Mathematica, matplotlib to define and analyze generalization to additional classes. Tested amended algorithm to said classes with similar software stack.
- Proved existence theorem: A class of structures associated to certain (NET) Thurston maps can be identified with a half-plane with hyperbolic geometry. Constructed subsets of this space whose boundaries do not contain elements corresponding to obstructions of these class members.
- Seminar presenter: Presented findings and background research in seminar organized by in-house research collaborators.

## Technical Skills

- Pure math research: Complex dynamics, topological dynamics, discrete conformal geometry
- Applied math: Statistical inference, statistical models and methods
- Math education and technical communication
- Programming Languages: Python, C++, JavaScript, (HTML, CSS)
- Data Science: Basic ML Algorithms and Optimization, Pandas library, Matplotlib

## Education

Virginia Polytechnic Institute and State University  
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Ph.D in Mathematics  
M.S. in Mathematics  
B.S. in Physics and Math

2021  
2016  
2014

## Publications

*Core Entropy of Finite Subdivision Rules*; Daniel Kim; doctoral dissertation

*Realizing Dynamic Portraits of Topological-Polynomial Type*; William Floyd, Daniel Kim, Sarah Koch, Walter Parry, Edgar Saenz; in preparation

*Nearly Euclidean Thurston Maps and the Halfspace Theorem*; Daniel Kim, Master's Thesis