# Hannah Park-Kaufmann

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## Education

**B.A. in Mathematics** 2020-2024

**B.M. in Classical Piano Performance** 2020-2025

*Bard College* Annandale-on-Hudson, NY

Cumulative GPA: 3.83/4.00

## Scholarships, Grants and Awards

Conservatory Scholarship
Distinguished Scientist Scholar Award (DSS)
DSS independent summer research grant
Sustainability Track at hackMIT 2022, winning project
International piano competition "Piano Talents", first prize
Austrian national piano competition "Prima la Musica", first prize

## Experience

**Murthy Lab Research Intern** 2022

*Harvard University* Cambridge, MA

Pianist Movement Efficiency Analysis through methods of computational ethology

- Quantifying the efficiency of types of movements at the piano, finally aiming to create a faithful artificial intelligence based posture analysis algorithm which can give real-time correcting feedback to pianists. (In progress) **Advisor:** Dr. Souvik Mandal

**Computational Mathematics for Data Science REU Researcher** 2022

*Emory University* Atlanta, GA

Data Assimilation for Glacier Models

- Combined computational mathematics with very tangible geoscience applications, implemented ensemble kalman filter to explore how data can best be used to improve predictions of glacier melt on simplified ice sheet model, and on a complex storm surge model to explore sea level rise and climate change impacts to hurricane storm surges. **Advisor:** Professor Talea Mayo

**Research Experience for Undergraduates(REU) Researcher** 2021

*Polymath Jr. REU* (Virtual)

Minimal Presentation Sizes of Numerical Semigroups

- Introduced a combinatorial approach involving posets to determine the attainable minimal presentation sizes given a fixed multiplicity, which has been a long-standing open problem in the field. **Advisor:** Professor Christopher O'Neill

**Math Tutor** 2022-present

*Bard Math Department*
*Bard Prison Initiative (BPI)* Annandale-on-Hudson | Green Haven, NY

- TA (dedicated course tutor) for Proofs and Fundamentals (MATH261), Time, Space and Infinity (MATH105), and one of the course tutors for Calculus 1 and 2 (MATH141 and Math142) at Bard
- Math tutor for BPI at Green Haven Correctional Facility

# Relevant Coursework

**Mathematics:** Complex Analysis, Discrete and Computational Geometry, Math Methods of Physics I, Abstract Algebra, Linear Algebra, Proofs and Fundamentals, Calculus II
**Programming:** Machine Learning, Data Structures, Object Oriented Programming
**Other:** To Overthrow the World, Translating Tact

# Skills

**Programming**

Extensive experience coding with Python, and significant experience with Java. Functionally proficient with MATLAB, Mathematica, C++, R, and coding 3D models with Blender. Comfortable with LaTeX, excel, and HTML/CSS.

**Data collection, modelling and analysis**

Turned physics-based model into python code. Generated realistic synthetic data sets for physical phenomena to run twin experiments on. Performed linear and nonlinear data assimilation on time series models and data. Ran large-scale mathematical calculations with sage. Implemented machine learning algorithms and dimensionality reduction for data analysis.

**Languages**

English (native), German (native), Chinese (fluent), Korean (proficient), French (beginner)

# Outreach & Leadership

**Co-head of Association for Women in Mathematics Club** 2022
*Bard College* Annandale-on-Hudson, NY

**Member of Outreach Committee** 2022
*Emory University Computational Mathematics for Data Science REU+RET* Atlanta, GA

– Maximizing the broader impact of the site with dissemination of the site's activities and results beyond the REU+RET

**Volunteer biography writer for the Deck 2 AWM Playing Cards** 2022
*Association for Women in Mathematics(AWM)*

# Publications

[1] Ceyhun Elmacioglu, Kieran Hilmer, Christopher O'Neill, Melin Okandan, **Hannah Park-Kaufmann**. On the cardinality of minimal presentations of numerical semigroups with fixed multiplicity. *In preparation for Journal of Algebraic Combinatorics*.

[2] Emily Corcoran, Logan Knudsen, **Hannah Park-Kaufmann**. Ensemble Kalman Filtering for Glacier Models. *Submitted to SURIO*. arXiv:2210.02647 (2022)

# Contributed Talks and Posters

[1] *Data Assimilation for Glacier Models*, presented at Emory Math Department Poster Presentations, Atlanta, GA, July 2022.

[2] *Minimal Presentation Sizes of Numerical Semigroups*, presented at the Joint Mathematics Meetings (JMM) - American Mathematical Society and Pi Mu Epsilon (AMS-PME) Poster Session, (virtual), April 2022.

[3] *Minimal Presentation Sizes of Numerical Semigroups*, presented at The Women in Mathematics in New England (WIMIN) at Smith College, Northampton, MA (virtual), October 2021.