Peter E. **Francis**

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I am completing a PhD in Mathematics, studying probability and combinatorics, and I'm passionate about quantative research and developement. Programming is a core part of who I am and what I do: I code for my research and for other side projects. I am looking forward to using my extensive experience for impactful, real-world projects.

Education

PhD in Mathematics (In progress)   *Stony Brook University*
- Advisor: Evita Nestoridi   *Sept. 2021 - May 2026 (Expected)*
- Thesis: Limit Profiles in Separation Distance for Markov Chains

B.A. in Mathematics, Valedictorian   *Gettysburg College*
- Major in Mathematics and Minor in Physics   *Sept. 2017 - May 2021*
- GPA: 4.25/4.33

Skills

Programming	Python (NumPy, SciPy, Pandas, Matplotlib, PIL, Cython, SymPy), LaTeX, Java, MatLab, R, Sage
Web & Network	Python (Flask, Gunicorn, SQLAlchemy), Javascript, HTML/CSS

Programming Projects

Each of these entries is a tool or app that I made. Click underlined text for more information.

AddComb	`JS`	Extensive library for fast additive combinatorics computation (currently used by many researchers)
IFS Fractals	`Python+JS`	Web tool and python-module to generate fast IFS fractals
graphPlot	`Python`	Python module that uses physics to find ideal plotting coordinates for nodes of graphs
Complex Functions	`JS`	A web app that plots colorful complex function transformations
Custom Julia Sets	`JS`	Web tool for generating Julia sets with custom parameters
Table Editor	`JS`	Web tool for editing and converting between various table formats
Autostereograms	`JS`	Web tool generating autostereograms (magic eyes)
Canvas Games	`JS`	Collection of games all made using the HTML Canvas element
Sedario	`Python+JS`	Abstract strategy game of my own invetion with real-time online multiplayer
Bingo	`Python+JS`	Real-time multiplayer interface for generating and playing bingo games
Online-Poker	`Python+JS`	Real-time multiplayer interface for games of Texas Holdem' and Omaha

Selected Publications & In-Progress Work

- Nearest Neighbors in a Poisson Point Process   *In Progress*   *Mar., 2025*
- Leading All the Way: Comparability in Vector Posets   *In Progress*   *Mar., 2025*
- Secrets and Quantifiers   *Math Horizons, MAA*   *Feb. 2021*
- Opponent Hand Estimation in the Game of Gin Rummy   *Proceedings of the AAAI, 35(17)*   *Feb. 2021*

Experience

Department of Mathematics   *Stony Brook University*
CALCULUS TEACHING ASSISTANT   *Fall 2021 - PRESENT*
- Teach recitation classes several times per week
- Grade homeworks and exams

Department of Mathematics   *Gettysburg College*

Linear Algebra Peer Learning Associate   *Jan. 2020 - Spring 2021*
- Wrote various Python projects and assisted in teaching course material

Calculus Peer Learning Associate   *Aug. 2019 - Spring 2021*
- Assisted Calculus II students in understanding concepts and course material
- Taught regular class sessions once a week using my own prepared material

CalcAid Tutor   *Spring 2018, Fall 2018, Spring 2020*
- Assisted students in understanding concepts and course material at weekly review sessions

Linear Algebra Grader   *Fall 2019 - Fall 2020*
- Held drop-in help sessions for typesetting

Extracurricular Activity

College Life Office   *Stony Brook University*

Advanced Technician   *Sept. 2017 - May 2021*
- Assisted in instruction of technicians.
- Operate and organize audio, lighting and other production equipment for large and small events.

Office of Communications and Marketing   *Gettysburg College*

Photographer   *Jan. 2018 - May 2021*
- Shoot and edit portraits and pictures for a wide variety of events.

Boy Scout Troop 616   *Harrington Park, NJ*

Eagle Scout, Project Coordinator   *Sept. 2017*
- Worked with 20 troop members of varying age groups to complete a Beechwood Forest Trail restoration and extension.

Design & 3D Modeling   Photography, Photoshop, Lightroom, Blender
Outdoors   Backpacking, Canoeing, Wilderness Skills, PADI Certified Advanced SCUBA Diver
Martial Arts   Tae Kwon Do