

# Stefan Clarke

Sherrerd Hall, Princeton University, 08540 | +1 609 250 3422 | sc8647@princeton.edu | [stefanclarke.github.io](https://github.com/stefanclarke)

## EDUCATION

---

2021-2026 **PhD in Operations Research and Financial Engineering**, Princeton University

Advised by Professor Bartolomeo Stellato

*Courses Taken:* Linear and nonlinear optimization, Convex optimization, Deep learning theory, Theory of reinforcement learning, Probability Theory, Stochastic calculus, Statistics

2017-2021 **MMath in Mathematics and Statistics**, University of Oxford, St John's College

Bachelor's part (Prelims, Part A, Part B): **First Class Honors**

**84%** (Part C) (1<sup>st</sup> in Oxford Cohort), **82%** (Part B) (4<sup>th</sup> in Oxford Cohort), **75%** (Part A), **72%** (Prelims)

*Courses Taken:* Statistical Machine Learning, Foundations of Statistical Inference, Applied Statistics, Computational Statistics, Applied Probability, Mathematical Models of Financial Derivatives; Probability, Measure and Martingales; Continuous Martingales and Stochastic Calculus, Information Theory, Statistics, Probability, Integration and Measure Theory, Algorithmic Foundations of Learning, Probability on Graphs and Lattices, Stochastic Differential Equations, Stochastic Analysis and PDEs, Limit theorems and Large Deviations in Probability

2010-2017 **The Nelson Thomlinson School**, Wigton, Cumbria

Mathematics, Further Mathematics, Chemistry, Biology, General Studies, A\*A\*A\*A\*A

## RESEARCH PAPERS

---

2024 **Differentiable Cutting Plane Layers for Mixed Integer Optimization** ([arXiv:2311.03350](https://arxiv.org/abs/2311.03350) preprint)

With Gabriele Dragotto, Jaime Fernandez-Fisac and Bartolomeo Stellato

- We propose a method to learn to quickly solve parametric families of integer programming problems using cutting planes and machine learning.
- We prove that our method can reproduce exactly many commonly used families of cutting planes.

2024 **Maximum Shannon Capacity of Photonic Structures** ([arXiv:2311.03350](https://arxiv.org/abs/2311.03350) preprint)

With Alessio Amaolo, Pengning Chao, Alejandro W Rodriguez, and others.

- We formulate bounds on the maximum Shannon capacity that may be achieved by photonic devices in general environments.
- Responsible for theory around the analytic optimum solution to the biconcave optimization problem.

2023 **Learning Rationality in Potential Games.** *Proceedings of the 62<sup>nd</sup> IEEE Conference on Decision and Control 2023, Singapore*

With Gabriele Dragotto, Jaime Fernandez-Fisac and Bartolomeo Stellato.

- We propose an optimization algorithm to learn the parameters of potential games which represent the rationality of the agent.
- We prove convergence of our algorithm and verify effectiveness on computational examples.

## EXPERIENCE

---

Jul 2020- Sep 2020 **G-Research, Summer Intern**, Quantitative Research, London

- 10-week long internship at G-Research. One of 16 interns globally. Used techniques in optimisation and dynamic programming to create different investment strategies using Python. Presented the final project to a panel of group heads.
- Participated in a group project on constrained trading strategy. Completed training in financial markets.

Jul 2019- Aug 2019 **Mathematical Institute, Machine Learning Research Intern**, University of Oxford

- Research project investigating neural processes to repair broken speech samples, and how different loss functions affect variance collapse in this context.
- Supervised by Dr. Vinayak Abrol.

March 2019 **Software, Spring Intern**, Software Engineering, London

- 3-week long spring insight programme with the software engineering team. Trained using JavaScript, HTML, CSS and SQL to complete a group project which consisted of creating a database and management system for shops and libraries.

## TEACHING EXPERIENCE

---

2023-2025 **ORF498/499: Senior Independent Research Foundations**

- Responsible for a group of around 15 ORFE seniors. Offered weekly meetings and advice and writing sessions to help them prepare their theses.

Spring 2023 **ORF307: Optimization.** Preceptor.

Fall 2022 **ORF309: Probability and Stochastic Systems.** Preceptor.

Fall 2022 **ORF523: Linear and Nonlinear Optimization**

- Responsible for an additional class each week to a small group of graduate students who had little background in optimization.

## RESEARCH PRESENTATIONS AND SEMINARS

---

Oct 2024 **INFORMS, Seattle, WA** – Reoptimization Methods in Integer Optimization.

Dec 2023 **CDC, Singapore** – Learning Rationality in Potential Games.

Oct 2023 **INFORMS, Phoenix, AZ** – Learning Rationality in Potential Games.

## AWARDS AND SCHOLARSHIPS

---

- 2023 **CDC Young Researcher Travel Grant**, CDC 2024, Singapore
- For successful submission of a research paper to the CDC conference.
- 2021 **Gibb's Prize**, Mathematics and Statistics, University of Oxford
- For the best examination performance in Oxford Mathematics and Statistics in 2021.
- 2019 **Special Research Grant**, St John's College, University of Oxford
- Grant from St John's College for doing research with the Mathematical Institute.
- 2018-2020 **Casberd Scholarship**, St John's College, University of Oxford (2018, 2019, 2020)
- For outstanding performance in end of year exams.

### Competitions

- **British Mathematical Olympiad**: distinction medal (2013), Qualified 4 times
- **UKMT British Schools Competition**: 23<sup>rd</sup> in the country (2012), Cumbrian runners up (2015, 2016)
- **British Young Enterprise**: first in three consecutive rounds, finalists (2016)

## EXTRACURRICULAR ACTIVITIES

---

- 2024- **Princeton Graduate Student Musicians Society**, *founder*.
- Responsible for the organization of jazz-music jam sessions, the hosting of concerts in the Princeton DBar, and the organization of socials.
- 2017- 2020 **St John's College Boat Club**, *Men's Vice Captain ('18-'19), President ('19-'20)*, University of Oxford
- Responsible for managing a team of around 50, purchasing boats and equipment, hiring staff and organising training schedules.
- 2020- 2021 **The Invariants (Oxford Maths Society)**, *Events Secretary*, University of Oxford
- Events Secretary of the mathematical society of Oxford University. Responsible for contacting sponsors to organise various events from workshops to networking and managing the logistics of existing Invariants Lectures.
- 2018- 2020 **OURCs**, *Webmaster*, University of Oxford
- Responsible for managing and updating the website that controls the University of Oxford Rowing System using Django.
- 2018- 2020 **St. John's Mathematics Society**, *Social Secretary*, University of Oxford
- Responsible for organising events within St. John's college mathematics.

## COMPUTER SKILLS

---

**Advanced:** Python (Pytorch, Tensorflow)

**Intermediate:** R, Julia

**Basic:** SQL, JavaScript, HTML, CSS

## INTERESTS

---

**Music** – Guitarist and pianist. Member of Scanderlous ([scanderlous.github.io](https://scanderlous.github.io)). Performed at Princeton DBar (5 times, 2022-2024), Princeton reunions (2023-2024), Mathey College (2023), Seher Spa and Resort (2024), Belek Beach (2024) and many more. Grade 8 guitar. Maryport and Whitehaven Amateur Theatre Group Guitarist 2016-2017. Founder of Princeton Graduate Musicians and Princeton Graduate Jazz Ensemble.

**Programming** – Highly proficient in Python. Completed extracurricular projects in reinforcement learning, such as learning to play [Haxball](#) and [Quoridor](#).

**Running** – Completed the Philadelphia Marathon (Nov 2022), the Brooklyn Half Marathon (April 2024), and (soon) the Princeton Half Marathon (November 2024).