Emilio Ferrucci

Curriculum Vitæ

Personal Information

Work address   Office S3.24, Mathematical Institute, University of Oxford

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Employment

04/22–   **Postdoctoral Research Associate**, *University of Oxford*, UK

A 3-year posdoctoral position, funded by DataSig https://datasig.web.ox.ac.uk/ (EPSRC programme grant EP/S026347/1), on the applications of rough path signatures to machine learning. I am still working on several more theoretical questions in probability theory, differential geometry and algebraic combinatorics.

From October 2022 I took up Research Membership of Common Room at Kellogg College.

10/21–04/22   **Research Assistant/Associate**, *Imperial College London*, UK

A 1-year fellowship at Imperial, funded by the EPSRC, during which I am concluding projects started during my PhD and planning further research in related fields.

02/16–05/16   **Software Developer**, *Cynny S.p.a.*, Firenze, Italy

I helped develop an interactive web and cross-platform mobile app which made use of deep learning for facial recognition.

Education

10/17–10/21   **PhD in Mathematics**, *Imperial College London*, UK

- Thesis title: *Rough path perspectives on the Itô-Stratonovich dilemma*
- Thesis available online at https://spiral.imperial.ac.uk/handle/10044/1/96036
- Advisors: Prof. Damiano Brigo, Dr. Thomas Cass, Dr. John Armstrong (King's College London)
- Viva examiners: Prof. Martin Hairer (internal), Prof. Zhongmin Qian (Oxford, external)
- Outcome: pass, subject to minor revisions
- First year (2016-17) recognised as *MRes in Financial Computing*, awarded with Distinction; PhD thesis handed in 10/2021, viva voce in 12/2021, PhD awarded in 02/2022

10/13–11/15   **MSc in Mathematics**, *Rheinische Friedrich-Wilhelms-Universität Bonn*, Germany

- Final mark: 1.3 ("sehr gut")
- ECTS Credits: 120 (2 years)
- Thesis Title: *Intrinsic Methods in the Theory of Surgery on Compact, Non-Simply Connected Manifolds*
- Thesis Advisors: Prof. Wolfgang Lück, Dr. Tibor Macko

09/09–03/13 **BSc in Mathematics**, *Università degli Studi di Firenze*, Italy
- Final mark: 110/110 cum laude
- ECTS Credits: 180 (3 years)
- Thesis Title: *Introductory Aspects of Morse Theory*
- Thesis Advisor: Prof. Giorgio Ottaviani

Teaching

06/2022- **Tutor**, *University of Oxford*, UK
- *Continuous martingales and Brownian motion*: intercollegiate tutorials, Mathematical Institute, Hilary term 2023;
- *Probability, Measure and Martingales*: intercollegiate tutorials, Mathematical Institute, Michaelmas term 2022;
- *Constructive Mathematics*: college tutorials, Wadham College, Trinity 2022;
- *Metric Spaces and Complex Analysis*: marking of final exam, Mathematical Institute, Trinity term 2022;

01/18–04/21 **Graduate Teaching Assistant**, *Imperial College London*, UK
- *Stochastic Processes*: lecture-style problem classes, marking and developing course materials; Autumn 2018, MSc Mathematical Finance
- *Interest Rate Models*: lecture-style problem classes, marking and developing course materials; Spring 2018 & Spring 2019, MSc Mathematical Finance
- *Complex Analysis*: demonstrating and marking; Spring 2020, BSc Mathematics
- *Introduction to University Mathematics*: interactive problem classes (virtual and in-person) and marking; Autumn 2020, BSc Mathematics;
- *Lebesgue Measure and Integration*: lecture-style problem classes (virtual) and marking; Spring 2021, BSc Mathematics
- *Stochastic Calculus for Finance*: lecture-style problem classes (virtual); Spring 2021, MSc Mathematical Finance

Awards and Honours

04/22 **Runner-up for Best Maths PhD Thesis at Imperial College London in 2021-22**
The position of runner-up is held jointly with one further person; there was a single winner. Around 30-40 people were awarded a PhD in mathematics by Imperial College in the period considered for the award, 03/2021-02/2022.

06/21 **Associate Fellow of the Higher Education Academy**, *Advance HE*
In recognition of attainment against the UK Professional Standards Framework for teaching and learning support in higher education, for my work as a graduate teaching assistant.

10/16-08/21 **PhD Studentship**, *EPSRC CDT in Financial Computing and Analytics*
A scholarship covering tuition and living expenses for four years of doctoral studies, and extended during covid.

10/14-07/15 **Graduate Scholarship**, *Deutscher Akademischer Austauschdienst*
A scholarship covering living expenses for the second year of my MSc degree, awarded on the basis of academic merit.

Publications and Preprints

2023 *Projections of SDEs onto submanifolds*
With John Armstrong and Damiano Brigo
Information Geometry (2023)
https://doi.org/10.1007/s41884-022-00093-7

2022 *On the Wiener chaos expansion of the signature of a Gaussian process*
With Thomas Cass
Preprint (2022)
https://arxiv.org/abs/2207.08422

2022 *A transfer principle for branched rough paths*
Preprint (2022)
https://arxiv.org/abs/2205.00582

2022 *Non-geometric rough paths on manifolds*
With John Armstrong, Damiano Brigo and Thomas Cass
Journal of the London Mathematical Society (2022)
https://doi.org/10.1112/jlms.12585

2022 *A combinatorial approach to geometric rough paths and their controlled paths*
With Thomas Cass, Bruce Driver and Christian Litterer
Journal of the London Mathematical Society (2022)
https://doi.org/10.1112/jlms.12589

2019 *Optimal approximation of SDEs on submanifolds: the Itô-vector and Itô-jet projections*
With John Armstrong and Damiano Brigo
Proceedings of the London Mathematical Society (2019)
https://doi.org/10.1112/plms.12226

Invited Talks

02/23 Modern Methods in Applied Stochastics and Nonparametric Statistics Seminar, Weierstrass
Institute for Applied Analysis and Stochastics, Berlin
Branched Itô formula and Itô-Stratonovich correction

02/23 Machine learning and rough path theory for sequential data analysis, Institute of Mathematics, Hanoi
Foundations of rough path theory

04/22 DataSig Advisory Board Meeting, Alan Turing Institute, London
Rough paths on manifolds

04/22 Algebraic and Combinatorial Perspectives in the Mathematical Sciences, Oslo (virtual)
A transfer principle for branched rough paths

02/22 Analysis Seminar, Potsdam (virtual)
The combinatorics and geometry of rough paths

02/22 DataSig Scientific Committee, Oxford (virtual)
A transfer principle for branched rough paths

02/21 Stochastic Analysis and Maths Finance Seminar, York (virtual)
A Stratonovich-Itô formula for the signature of a Gaussian process

01/21 Rough Path Interest Group, Oxford (virtual)
A Stratonovich-Itô formula for the signature of a Gaussian process

Other academic activities

08/22 Organiser for workshop *Rough Analysis and Applications to Data Science* to be held at Imperial College

09/21 Because of the award below, I was chosen to represent the department at the Faculty of Natural Sciences Research Showcase with a talk of the same title, aimed at an audience with a scientific background

08/21 Runner up prize in the Maths PhD Symposium, held within the department of mathematics, for a short talk titled *Rough calculus on smooth manifolds*, aimed at a general mathematical audience

06/18 Helped organise the *SAGEST workshop* on stochastic analysis, geometry and statistics, hosted at Imperial College

02/17 Contributed material for the *Imperial Fringe* exhibition *The future of futures trading*, aimed at explaining the derivatives market to the general public

London, October 17, 2024