

Matt Dunlop | Curriculum Vitae

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Applied mathematician experienced with high-dimensional Bayesian methodology and machine learning. Transitioning into industry to apply skills to real-world problems after honing expertise as a postdoc.

Employment

2019–2022 **New York University**, *Postdoctoral Associate*.

Courant Institute of Mathematical Sciences.

- Performed research in areas of Bayesian inversion and machine learning, including Bayesian neural networks and seismic inversion.
- Published articles in journals such as SIAM JUQ, IPI and SMAI-JCM.
- Gave numerous invited talks at conferences/universities.
- Supervised by Prof. Georg Stadler.

2018–2019 **University of Helsinki**, *Postdoctoral Researcher*.

Department of Mathematics and Statistics.

- Performed research in area of Bayesian hyperparameter optimization, including MAP estimation and Empirical Bayes.
- Gave numerous invited talks at conferences/universities.
- Presented an invited mini-course on Gaussian Processes at University of Oulu.
- Supervised by Prof. Tapio Helin.

2016–2018 **California Institute of Technology**, *Postdoctoral Scholar*.

Department of Computational and Mathematical Sciences.

- Performed research in areas of Bayesian inversion and machine learning, including hyperparameter optimization and deep Gaussian processes.
- Published articles in journals such as JMLR, SIAM JUQ and Inverse Problems.
- Gave numerous invited talks at conferences/universities.
- Aided in the creation of a graduate course on Linear Analysis, and acted as TA for the course.
- Supervised by Prof. Andrew Stuart.

Education

2013–2016 **PhD Mathematics and Statistics**, *University of Warwick*, UK.

Title: Analysis and Computation for Bayesian Inverse Problems.

Supervisors: Prof. Andrew Stuart and Dr. Marco Iglesias.

2012–2013 **MSc Mathematics and Statistics**, *University of Warwick*, UK.

Dissertation title: On the support of diffusion processes with irregular drift coefficients.

Supervisor: Prof. Xue-Mei Li.

Grade: Distinction.

2008–2012 **MMath Mathematics**, *University of Warwick*, UK.

Dissertation title: Malliavin calculus and applications.

Supervisor: Prof. Xue-Mei Li.

Grade: First class honours (92%).

Key skills

Over 20 years of programming experience in numerous languages. Most frequently used languages/software are as follows.

Coding Python, MATLAB, SQL, C++, PHP, HTML, CSS, JavaScript, \LaTeX .

Other GitHub, Bash, Microsoft Office.

Research Papers

Total of 14 publications with 453 citations. A selection of publications are as follows.

M. M. Dunlop, M. Girolami, A. M. Stuart, A. L. Teckentrup. "How deep are deep Gaussian processes?" *Journal of Machine Learning Research* **19** 54 (2018) 1-46.

M. M. Dunlop, D. Slepčev, A. M. Stuart, M. Thorpe. "Large data and zero noise limits of graph-based semi-supervised learning algorithms." *Applied and Computational Harmonic Analysis* **49** 2 (2020) 655-697.

C. Li, M. M. Dunlop, G. Stadler "Bayesian neural network priors for edge-preserving inversion." *Inverse Problems and Imaging* **16** 5 (2022).

M. M. Dunlop, M. A. Iglesias, A. M. Stuart. "Hierarchical Bayesian level set inversion." *Statistics and Computing* **27** 6 (2017) 1555 - 1584.

M. M. Dunlop, T. Helin, A. M. Stuart. "Hyperparameter estimation in Bayesian MAP estimation: parameterizations and consistency." *SMAI Journal of Computational Mathematics* **6** (2020) 69-100.

D. Calvetti, M. M. Dunlop, E. Somersalo and A. M. Stuart. "Iterative updating of model error for Bayesian inversion." *Inverse Problems* **34** 2 (2017) 025008.

Supervision and Organization

- 2018 **Co-organizer** of the minisymposium "Data and UQ: Bayesian learning" at SIAM UQ 2018, Garden Grove, California, USA.
- 2017 **Co-supervisor** of Victor Chen, undergraduate research student, California Institute of Technology.
- 2016 **Co-organizer** of the minisymposium "Large-Scale PDE constrained Bayesian Inverse Problems" at SIAM UQ 2016, Lausanne, Switzerland.
- 2015 **President of Warwick SIAM student chapter.**
Duties included sourcing speakers for a seminar series, and co-organization of two small conferences.

Professional Certificates

- 2023 **Google Data Analytics**, Google.
- 2023 **IBM Full Stack Software Developer**, IBM Skills Network.
- 2023 **IBM AI Engineering**, IBM Skills Network.
- 2023 **IBM Data Science**, IBM Skills Network.

References

Available upon request.