CHARLOTTE SWEENEY

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EDUCATION

DPhil Autonomous Intelligent Machines and Systems (AIMS) 2024 - Current
University of Oxford

- EPSRC funded doctoral program focusing on machine learning and its applications in the areas of robotics, vision, cyber-physical systems, control, and verification.

MSc Statistical Science, *Distinction* 2023 - 2024
University of Oxford

- Highlighted Courses: *Advanced Statistical Machine Learning, Bayes Methods, Probability and Statistics for Network Analysis, Graphical Models.*

BSc (Hons) Computer Science and Mathematics, *First Class* 2019 - 2023
University of Edinburgh

- Computer Science Honours Courses: *Machine Learning and Pattern Recognition, Reinforcement Learning, Randomised Algorithms, Introduction to Theoretical Computer Science.*
- Maths Honours Courses: *Algebraic Topology, General Topology, Combinatorics and Graph Theory, Complex Variables, Analysis, Algebra, Symmetry and Geometry.*

RESEARCH EXPERIENCE AND PROJECTS

Master's Dissertation (3 months) 2024
Uncertainty Quantification of Protein Structure Predictions in the Context of Protein Flexibility

- Master's dissertation, supervised by Prof Yee Whye Teh.
- Estimated the conformational flexibility of AlphaFold2's protein structure predictions through quantification of the prediction's aleatoric uncertainty.
- Involved the adaptation of AlphaFold2's Structure Module to produce uncertainty estimates and an analysis of the reliability of such estimates.

Undergraduate Dissertation 2022 - 2023
An Experimental Study of Persistent Homology Dimension Regularisation

- Honours Project dissertation, supervised by Dr Rik Sarkar.
- Explored the links between generalisation, compressibility, and the noise distribution of network trajectories in SGD through an existing persistent homology dimension regularisation method.
- Involved work in the fields of topological data analysis, network pruning, and basic stochastic differential equations.

Research Assistant (6 months) 2022 - 2023
University of Oxford

- Research project titled *Double Descent and Deep Learning* under the supervision of Prof Seth Flaxman and Prof Samir Bhatt.
- Work concerned with exploring how the generalisation accuracy of neural networks varies with the number of parameters.
- Involved testing a conjecture relating the Double Descent phenomenon to the increasing number of solutions in an over-parameterised system within kernel regression and Gaussian processes.
- Delivered a presentation on the findings of the project in a conference-like setting to my peers and supervisors.

- Work was initially part of a 10 week UNIQ+ DeepMind Internship and later continued for an additional 3 months.

PUBLICATIONS AND WORKSHOPS

- Charlotte Sweeney, Nele Quast, Fabian Spoendlin, Yee Whye Teh, *Uncertainty Quantification of Protein Structure Predictions in the Context of Protein Flexibility*, 2024 NeurIPS Machine Learning in Structural Biology Workshop

PUBLIC ENGAGEMENT

- Took part in the 2025 Oxplore festival in Bradford and Warrington where I ran an exhibition stall on modelling the impact of climate initiatives. The festival aims to increase the number of applications to university in UK regions where there are few. It is intended towards secondary school pupils where they can explore what university entails and the kind of subjects that they can study.