

OSCAR DAVIS

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<https://github.com/olsdavis>

EDUCATION

- PhD in Computer Science**, University of Oxford Oct 2023 – Jul 2026
• Funded by Project CETI and Intel. Supervised by Prof M. Bronstein, Dr İ. Ceylan, and Dr A.J. Bose.
- MSc in Advanced Computer Science**, University of Oxford Oct 2022 – Aug 2023
• Supervised by Prof M. Bronstein and Dr İ. Ceylan. Obtained with distinction.
- Visting Student**, Imperial College, London Sep 2021 – Jul 2022
• Supervised by Prof A. Gervais. Funded by Swiss scholarship. Finished with distinction.
- BSc in Computer Science**, EPFL Sep 2019 – Jul 2022

RESEARCH EXPERIENCE

- Research Intern at Microsoft Research, Cambridge**, with Dr J. Gladrow & Dr K. Kalinin Nov 2023 – Feb 2024
• Engineering work on Diffusion Models, Latent Diffusion Models, VAEs, simple video models, Neural ODEs.
• Theoretical analyses of Diffusion Models via SDEs, PDEs. (*Patent coming soon!*)
- MSc Dissertation**, Information Theory for GNNs, with Dr. İ. Ceylan, Prof. M. Bronstein Feb 2023 – Aug 2023
• Developed a formal information-theoretic framework to fully characterise informational bottlenecks in Graph Neural Networks, including over-smoothing and over-squashing. The analysis involved advanced concepts in information theory, and linear algebra. *Received the Tony Hoare Prize for the best dissertation of the year.*
- BSc Research Project**, DeFi analysis, with Prof A. Gervais Jan 2022 – Aug 2022
• Analysed DeFi markets on the Ethereum and BNB Chain blockchains, quantified offered financial security.
• Created a program in Go using a custom GPU version of Bellman-Ford in CUDA to detect real-time arbitrage opportunities, and to quantify historically how much more assets could have been extracted, scanning $864 \times$ more markets than previous SOTA within 1.5 ± 1.2 seconds, outperforming past arbitrage by on average 0.06 ETH and up to 4.4 ETH.
- Student Research Project**, Scala 3.0 Compiler Extension, with Prof M. Odersky Jun 2021 – Sep 2021
• Participated to the thread-safe re-implementation of “lazy-vals”, in the Scala 3.0 compiler.

TEACHING EXPERIENCE

- Graduate Teaching and Research Scholarship in CS**, Oriel College, Oxford Apr 2025 – Present
• Teaching first- and second-year courses to students of Oriel College.
- TA for Geometric Deep Learning**, University of Oxford, under Prof. M. Bronstein Jan – Mar 2025
• Teaching PyTorch implementations of geometric models (equivariance, invariance) and others (e.g., neural diffusion).
- TA for OÄW Winter AI School 2025**, OÄW, Vienna (Austria) Jan 2025
• Gave two PyTorch tutorials: one on implementing Graph Neural Networks; one on (Riemannian) flow matching.
- TA for Graph Representation Learning**, University of Oxford, under Dr. İ Ceylan Oct – Dec 2023 and 2024
• Teaching PyTorch and PyTorch Geometric (for Graph Neural Networks, and Knowledge Graph Learning).
- TA for Object-Oriented Programming (Java)**, EPFL, under Dr M. Schinz Feb – Jun 2020
• Second most prolific helper on the student forum.
• Leader of marking group for final projects.

PUBLICATIONS

SOAPI: Siamese-guided Generation of Off-Target-Avoiding Protein Interactions Mar 2025
Vincoff, S., **Davis, O.**, Tong, A., Bose, J., Chatterjee, P. **ICLR 2025 Workshops: GEM (Spotlight) and LMRL.**

Fisher Flow Matching for Generative Modeling over Discrete Data May 2024
Davis, O., Kessler, S., Petrache, M., Ceylan, I., Bronstein, M., Bose, AJ. **NeurIPS 2024.**
Camera-ready: arxiv.org/abs/2405.14664.

ACADEMIC ACHIEVEMENTS

G-Research Grant for PhD Students and Postdocs (£1k) Feb 2024

Tony Hoare Prize for the best MSc Dissertation, University of Oxford Sep 2023
• Prize awarded for my dissertation titled “Information-Theoretic Perspectives on Graph Neural Networks.”

Swiss Study Foundation Scholarship Sep 2021
• Granted based on academic performance (almost 100% GPA on my last term’s exams).

French Scientific Baccalaureate with Advanced Mathematics 2019
• Obtained high honours, and 100% in Mathematics, with the Advanced Mathematics option.

French National Mathematics Olympiads 2017
• Obtained a distinction in the Bordeaux academy.

SKILLS

Proficient in	Python (PyTorch, PyG, NumPy, Matplotlib), Java, Scala (Spark, Akka), Go, C
Languages	Fluent in French, English and Russian, basic in German
Music	Piano (ABRSM 8), guitar (self-taught, beginner), composition, arrangement, sound-engineering