Amelia Ghanea

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Profile

- First Year MPhil student at UCL Institute of Health Informatics developing machine learning frameworks for rare disease research.
- First Class Neuroscience BSc Hons from the University of Bristol.
- Recipient of the 2024 Snowdon Master's Scholarship and member of the Windsor Fellowship.

Education

Health Informatics MPhil/PhD, University College London 05/2025 - Present

- Research focus: Machine learning frameworks for understanding complex disease relationships in the EDS-POTS-MCAS triad
- Developing multi-modal GARNN architecture integrating heterogeneous features (symptoms, treatments, demographics) for disease trajectory prediction, implementing interpretable variants with attention visualisation to identify patient subgroups, and exploring causal attention mechanisms to distinguish correlation from causation in comorbidity patterns

Neuroscience BSc: First Class Hons with PLUS Award, 2021 - 2024
University of Bristol

Experience

ML Research Scientist, ADVAI 04/2025 - Present

- Led research on **bias detection** in **medical LLMs** using **mechanistic interpretability** techniques, developing novel internal intervention methods for **fairness evaluation**
- Achieved measurable bias replication through model feature manipulation, demonstrating demographic effects with >0.8 Jaccard similarity to prompt-based biases
- Currently preparing research paper for conference submission on mechanistic interpretability approaches to clinical AI fairness

Freelance Consulting, University of Oxford 07/2025 - Present

- Developed **full-stack** AI-enhanced decision-making platform with interactive dashboard (**Vercel** deployment) featuring custom inference models, parameter weighting, and **hybrid genAI architecture**

Technology Optimisation Intern, Windsor Fellowship, 06/2024 - 08/2024
Elsevier - Global Health Markets

- Produced first Software Development Lifecycle plan for Elsevier's Health Markets, using Jira APIs (**React & Node.js**), reducing average time spent on admin tasks 58%.
- Piloted **bias mitigation** research for ClinicalKey AI tool, developing proof-of-concept **Retrieval-Augmented-Generation** system for 1,000,000+ peer-reviewed medical papers

Consultant Computational Neuroscientist, Neuro-Bio Ltd 05/2023 - 05/2024

- Led research on 90+ proprietary polyclonal antibodies via **Western Blot** and **ELISA**, created specificity database that saved £500k on low-quality assays and halved lead candidate identification time
- Co-led anti-aging research collaboration with Unilever, using **Python** and **R** for high-throughput, multivariate compound selection
- Built **PyTorch** pipelines for **cell assay** processing: 99.98% accuracy (from 71%), 85% faster analysis
- Led **computational drug development** using **molecular dynamics simulations** (AutoDock Vina, GROMACS) and **AI/ML tools** (RoseTTAFold All-Atom, GNNs), achieving 40% improvement in binding affinity prediction accuracy and 25% better target selectivity

Research Assistant, Mouthy Ltd 06/2022 - 12/2023

- Produced integrated **database** for clinical market research, contributing to successful early-stage VC funding and identifying key barriers to dental insurance access through **demographic analysis**.

Awards & Projects

Full Master's Scholarship, Snowdon Trust

- Scholarship for exceptional students to enable further study in their field of choice and promote change as leaders in their subject area. Selected from 572 applicants (top 1.4%). Currently leading research project investigating EDS-Neurodiversity correlation

AI and Digital Health Hackathon, Overall Winner, University College London

- Developed ScleroDx: **AI-powered diagnostic tool** for sclerosis addressing **health equity in rare disease diagnosis**
- GitHub: github.com/Amelia3141/Hackathon

3rd Year UG thesis on "Ivabradine and the Risk of Torsades de Pointes: A Case-Based Analysis"

- Achieved a **grade of 84 overall and 89 on Viva exam**
- Developed **BioBERT**-based text mining system for automated **pharmacovigilance**
- Created **open-access web tool** for systematic reviews of torsadogenic medication with manuscript in preparation
- GitHub: https://github.com/Amelia3141/IvabradineTdP

PLUS Award, University of Bristol

Student Research Festival, First Place, University of Bristol

- My paper and conference presentation on ‘The Neurobiology of Ethical Decision Making’ won first place in UoB's Student Research Festival.

Skills

Programming Languages & Frameworks – Python (PyTorch, Pandas, scikit-learn) | R (Statistics) | JavaScript

Data Science & ML – **Foundation Models:** BioBERT, RAG models for medical literature | **Machine Learning:** GARNN, XGBoost | **Mechanistic Interpretability:** SAEs & feature clamping for LLM bias detection | **Temporal and causal modeling** for biomedical research | **High-throughput health data processing and collection**

Scientific Computing – **Bioinformatics & Drug Development:** GSEA, GWAS, RoseTTAFold