KRISTINA ULICNA

PhD Student (Year 2 / 4) @ UCL

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Computer Skills

Strongest programming language: ***Python***
- *Machine learning libraries:* skimage, sklearn, tensorflow 2.0, keras, CSBDeep
- *Standard & scientific libraries:* jupyter notebooks, numpy, scipy, pandas, json, matplotlib, pyplot, plotly, h5py, xml.tree

Work comfortably in ***LaTeX*** (with overleaf), & ***Sigmaplot Statistics*** (t-test, ANOVA)

Analysis of **DNA sequencing** data :
- SnapGene software: vector construction
- CLC workbench: Sanger sequencing
- Nanopore sequencing platform interface

Laboratory Skills

Molecular biology & vector construction:
- PCR (also colony, sequential, nested)
- Plasmid preparation (mini- & midi-prep)
- Restriction endonuclease gene cloning
- Gateway cloning & Gibson Assembly
- Preparation & purification of mRNA
- Cell-free protein synthesis (PURExpress)

Cell engineering & tissue culture:
- Stable cell transfection via lipofection & lentiviral & retroviral transduction
- Colony selection with titrated antibiotics
- Tet(Dox)-inducible gene expression
- Cell fractionation & organelle isolation
- Induction of cell differentiation (DMSO)
- Cell culture (passaging) with cell lines: *HeLa, HL60, CHO, HEK-293, MCF-7 / 10A, MDA-MB-231, HMLER, LNCaP, HaCaT*

Cell-based assays & imaging platforms:
- Cell proliferation assay (IncuCyte ZOOM live-cell analysis system)
- Colorimetric cell viability assay (MTT)
- Ratiometric [Ca^{2+}] release assay (Fura-2)
- Fluorimetric Cat-S release assay (MCA)

Gene expression detection methods:
- Primer-based reverse-transcription PCR
- SDS-PAGE, Western (dot) blotting
- Immunocytochemistry (IF cell staining)
- Extra- & intracellular flow cytometry
- Fluorescence-activated cell sorting & FACS-sorted clonal cell line expansion

Summary

*As a **PhD researcher** at UCL, I apply my **programming & laboratory skills** in a multi-disciplinary project combining cancer cell biology, computational single-cell tracking & **deep learning**. I focus on **Python software development** for **large data analysis** to identify biological patterns influencing **cancer cell cycling** control mechanisms. I am a practical, detail-oriented scientist with **cell engineering** background & **leadership skills** demonstrated in individual & collective settings, which I gained through work experience in **biomedical research** groups in **academia & industry** in the UK & US, and through my involvement in **volunteering & community projects**.*

Education

Oct 2018 – Sep 2022 (expected) — **PhD in Biosciences, BBSRC LIDo DTP Programme, UCL** | London, UK
- Provisional Thesis Title: *"Deep Lineage with Deep Learning: Tracking Single-Cell Heterogeneity within Non-/Cancer Cell Lines"*, advised by G. Charras & A. Lowe
- Fully funded via London Interdisciplinary Doctoral Training Partnership (LIDo DTP)
- Yale School of Medicine Collaborative Student 2020 (exchange postponed to 2021)
- Merit-based Scholarships: Talents of the New Europe *'19*, Students to the World *'19*

Sep 2014 – Jul 2018 — **BSc Biomedical Science (Hons), King's College London** | London, UK
- First Class Hons **(76%)** Biomedical Science with Extramural Year in Pharmacology
- Awards & Scholarships: Desmond Tutu Scholarship *'14*, Best Lay Article Award *'15*

Teaching Experience

Jun 2020 — **"Introduction to Deep Learning" @ UCL Cancer Domain** | London, UK
- Delivered a beginner-friendly masterclass for 100+ interdisciplinary scientists with real-life examples of deep learning-based bioimage analysis from my PhD project
- Demonstrated deep learning benefits, contrasted deep learning to computer vision methods, emphasised fundamentals of 'learning' component & current challenges

Mar 2020 — **Graduate Teaching Assistant, BIOC0016 module @ UCL** | London, UK
- Co-designed an iPython-based practical session for 70+ undergraduate students for introductory concepts in bioimage analysis, bioinformatics & machine learning
- Tutored students to hand-label mini-dataset & train simplified CNN to classify cell mitotic state based on chromatin condensation level from fluorescence readouts

Research Experience

Mar 2019 – Present — **PhD Researcher, the "DeepTree" project @ UCL** | London, UK
- **Ulicna K.**, Vallardi G., Charras G. & Lowe A. R. (**2020**). ***Automated deep lineage tree analysis using a Bayesian single cell tracking approach.*** bioRxiv 2020.09.10.276980
- Co-developed a robust, supervision-free, deep learning-based tracking pipeline for deep lineage analysis of large time-lapse microscopy data in non-/cancer cell lines
- Prepared publication manuscript outlining computational framework (*U-Net, CNN, bTrack* multi-object tracking algorithm) & its applicability for cell cycle research
- Analysed multigenerational lineage trees (>20,000 single cells) to identify heritable proliferation characteristics which predispose cell to acquire cancer-like properties

Sep 2016 – Aug 2017 — **Industrial Trainee @ Crescendo Biologics Ltd.** | Cambridge, UK
- Engineered novel, universal tool cell line for early drug discovery, i.e. phage display selection & functional screening of antibody fragment oncology therapeutics
- Presented project outcomes to senior scientists & company management board

Jun 2016 – Sep 2016 — **Research Intern, CRUK @ University of Cambridge** | Cambridge, UK
- S. Bohndiek Lab: Characterised anti-angiogenic drug effects via breast cancer cell-based growth, viability assays to evaluate oxygen role in cancer progression

Jun 2015 – Aug 2015 — **Visiting Scholar, Whitehead Institute @ MIT** | Cambridge, USA
- R. Weinberg's Lab: Investigated determinants of cancer cell invasion, metastasis & tumour stroma immunomodulation upon epithelial-to-mesenchymal transition

Leadership & Teamwork Experience

Sep 2019 – Present — **Student Ambassador, LIDo PhD Programme @ UCL** | London, UK
- Outlined programme structure & shared own experience with new student cohorts
- Guided individual students through responsibilities with changing rotation projects

Jul 2019 — **Rotating Delegate @ The European Union Council** | Helsinki, Finland
- Shortlisted by *Slovak Youth Council* as representative at *EU Youth Conference series*

Aug 2017 — **Young Delegate, Youth Assembly @ United Nations** | New York, USA
- Selected on basis of volunteering activity & community service project involvement

Language Skills

Slovak — native proficiency

Czech — bilingual proficiency

English — full professional proficiency

IELTS & iBT TOEFL language test certificates

German — limited working proficiency

High-school certificate; German evening classes

Hobbies & Interests

- Ballroom dancing; standard & Latin style (UK national partner competitions level)
- Bachata & salsa social dancing (int/adv)
- Long-distance running (half-marathons)
- Playing tennis (competitively at school)
- 'Stress-release' boxing & martial arts

General

- Member of the London Stem Cell Network (since Dec 2019)
- Member of the University of London DanceSport Society (since Sep 2019)
- Member of the British Pharmacological Society (since Sep 2017)
- Slovak (European Union) driving licence | *B type* (since Jun 2013)
- First aid training course certificate (Mar 2013)

Academic Referees

Prof Guillaume Charras

– PhD project advisor; Professor in Cell & Tissue Biophysics @ London Centre for Nanotechnology & Dept. of Cell & Developmental Biology @ UCL

- *Web:* https://charraslab.com/
- *Email:* g.charras@ucl.ac.uk

Dr Alan R. Lowe

– PhD project advisor; AI for Science Fellow @ The Alan Turing Institute & Associate Professor of Biophysics at Inst. of Struct. & Molec. Biology @ UCL

- *Web:* http://lowe.cs.ucl.ac.uk/
- *Email:* a.lowe@ucl.ac.uk

Prof Geraint Thomas

– LIDo PhD Programme Deputy Director; Professor of Biochemistry at Dept. of Cell & Developmental Biology @ UCL

- *Web:* https://www.lido-dtp.ac.uk/
- *Email:* g.thomas@ucl.ac.uk

Leadership & Teamwork Experience (cont'd)

Mar 2017 — **Category Finalist, Telegraph STEM Awards @ GSK** | London, UK
- Presented an early-stage healthcare team invention pitch to expert industry judges

2015 – 2017 — **Jury Member, LEAF Award @ LEAF** | Bratislava, Slovakia
- Shortlisted self-driven, talented students with community involvement in jury team

2016 – 2018 — **University Mentor, Talent Guide @ LEAF** | Bratislava, Slovakia
- Counselled college choices with gifted high-schoolers & edited personal statements

Specialist Trainings & Summer Schools

Dec 2019 – Jan 2020 — **Jumping Rivers Ltd.** | London, UK
- Two intermediate courses: *'Machine Learning with Python'*, *'Python & Tensorflow'*

Aug - Sep 2019 — **University of Hong Kong** | Hong Kong, China
- Practical course *'Advanced Imaging: Deep Learning in Live Imaging & Cell Biology'*

Jun - Jul 2019 — **University of Genova** | Genova, Italy
- *'Machine Learning Crash Course'* covering theoretical foundations & core concepts

Sep – Oct 2016 — **University of Cambridge** | Cambridge, UK
- Two beginners courses: *'Solving Biological Problems'*, *'Statistical Analysis'* using *R*

Jun – Jul 2012 — **Johns Hopkins University** | Baltimore, USA
- Interactive class *'The History of Disease'* by Centre for Talented Youth (CTY JHU)

Contributed & Invited Talks

Contributed Talks: with research project *"Deep Lineage with Deep Learning – Tracking the Single-Cell Heterogeneity within Non-/Cancer Cell Populations"* as a PhD research student

Jan 2021 — **Imperial College London** | London, UK | virtual
- Virtual Seminars in Biomedical Science

Dec 2020 — **London Stem Cell Network & Francis Crick Institute** | London, UK | virtual
- London Stem Cell Network 3rd Annual Symposium *(poster)*

Nov 2020 — **UCL, University of London** | London, UK | virtual
- UCL Bioimage Analysis Interest Group

Nov 2020 — **#PyLadies Dublin** | Dublin, Ireland | virtual
- Python Software Foundation Pro Network Meetup

Sep 2020 — **Society of Biomolecular Imaging & Informatics (SBI²)** | Boston, MA, USA | virtual
- SBI² High Content 2020 7th Annual Conference

Jun 2020 — **UCL & Birkbeck, University of London** | London, UK | virtual
- Institute of Structural & Molecular Biology Postgraduate Symposium

Nov 2019 — **Birkbeck, University of London** | London, UK
- Institute of Structural & Molecular Biology Friday Wrap Talk

Oct 2019 — **King's College London** | London, UK
- Quantitative Systems Biology Workshop 2019

Feb 2019 — **Francis Crick Institute** | London, UK
- Francis Crick Institute & UCL Graduate Student Symposium *(poster)*

Invited Talks: with research project *"Lipoproteins as a Vehicle for Targeted Drug Delivery in Photodynamic Therapy of Cancer"* as a pre-college student with university collaboration

Sep 2015 — **Universal Expo Milano 2015** | Milan, Italy
- Presented ongoing research as national team member to expert & lay audience

May 2014 — **Intel International Science & Engineering Fair** | Los Angeles, USA
- Shortlisted finalist at world's largest pre-college science competition *(poster talk)*

Jul 2013 — **International Congress of Young Investigators** | Zaragoza, Spain
- Invited as *'Absolute Winner at the Festival of Science & Technology'* & recipient of *'The Special Award by the Dean of the Faculty of Natural Sciences'*

Nov 2012 — **Festival of Science & Technology** | Bratislava, Slovakia
- Recognised as *'Best Scientific Project at Festival of Science & Technology 2012'*

Selected Publications

Ulicna, K., Vallardi, G., Charras, G. & Lowe, A. R. (**2020**). *Automated deep lineage tree analysis using a Bayesian single cell tracking approach.* bioRxiv 2020.09.10.276980 DOI: 10.1101/2020.09.10.276980 | GitHub: https://github.com/KristinaUlicna/DeepTree