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James Wilsenach

Education

2017-Pres. **PhD Statistics**, *University of Oxford (OU)*, Topic: Analysis of Single Neuron Integration Dynamics with 2/3D Calcium Imaging.

2016/7 **MSc Informatics: Neuroinformatics & Machine Learning**, *University of Edinburgh* (UoE), Thesis: Differential Network Analysis of the Neocortex in Development & Ageing.

2015 **BScHons Mathematics: Biomathematics**, *Stellenbosch University* (SU) *& The African Institute for Mathematical Sciences* (AIMS), Thesis: Physically Inspired Evolutionary Fields as a Model for Adaptive Dynamics of Food Webs and Ecological Communities.

2011-2014 **BSc**, *University of Cape Town* (UCT), Triple Major: Mathematics, Statistics and Genetics.

Academic Awards & Scholarships

PhD: 2017 UK Commonwealth PhD Scholarship for Developing Countries

2017 Oxford Oppenheimer Scholarship

2017 Selected for Unilever Graduate Scholarship in the Sciences at St Cross College, Oxford

2017 Selected for UoE Principal's Career Development & Global Research Scholarship

MSc: 2017 Top Performance Prize for MSc in Informatics

BSc: 2016 Golden Key Honours Society Membership

2015 Graduated BScHons Mathematics *cum laude, dux literatum*

2012/3 Dean's Merit List

Research

Publications, Conferences & Competitions

Jan 2020 **Poster Presentation**, Quantitative BioImaging (QBI), Title: 3D Model Building Pipeline for Light-Sheet Imaging of Hippocampal Neurons for Simulation and Analysis of Calcium Dynamics.

Oct 2019 **Conference Competition Winner**, BR41N.IO, BR41N.IO, The Brain-Computer Interface Designer's Competition, was the opening event of the IEEE Systems, Man and Cybernetics Conference, 2019.

Sep 2018 **Poster Presentation**, COSTNET, Title: CommFinedWalker: Controlling for Inspection Bias in Annotated Networks.

Sep 2017 **Conference Speaker**, Models in Population Dynamics and Ecology (MPDE), Talk Title: The Applicability of Field Theories in The Population Sciences.

Apr 2017 **Research Publication**, *J. Wilsenach, P. Landi, C. Hui*, Physical Review E, Evolutionary Fields Can Explain Patterns of High Dimensional Complexity in Ecology.
doi.org/10.1103/PhysRevE.95.042401

Jun 2015 **Poster Presentation & Workshop Attendee**, Meaningful Modelling of Epidemiological Data (MMED), Developed important statistical modelling skills to formulate research questions and conduct studies and experiments in the area of pubic health.

Student Research Projects

2017-Pres. **PhD Thesis: Analysis of Single Neuron Integration Dynamics with 2/3D Calcium Imaging**, OU Department of Statistics, Analysing 3D and 2D dynamic and static images of single whole neurons in brain slices of rat hippocampus. A combination of signal and processing techniques are used to automatically extract complete 3D neuronal structure from static light sheet microscope images and then localise dendritic events and action potentials occurring within the neuron using dynamic 2D and 3D light sheet calcium images. A dynamic simulation based on extracted 3D neuronal structures has also been produced and presented at QBI 2020., Supervisors: Charlotte M. Deane & Gesine Reinert.
Experimental Collaborators: Nigel Emptage & Peter Haslehurst

2017 **MSc Thesis: Differential Network Analysis of the Neocortex in Development & Ageing**, UoE School of Informatics, Comparative analysis of rat and human gene expression modules across developmental and neurodegenerative disease progression using Gene Ontology terms and network-based gene enrichment analysis, Supervisors: Dr Ian Simpson & Prof Douglas Armstrong.

2015/6 **BScHons Thesis: Physically Inspired Evolutionary Fields as a Model for Adaptive Dynamics of Food Webs and Ecological Communities**, SU Department of Mathematics, Formalised a new dynamical model for systems of populations that are competing/cooperating and thus co-evolving with each other. Later this model was published after it was found that it reproduced complexity and spectral properties of real ecological time series not observed in other models, Supervisors: Prof Cang Hui, Dr Pietro Landi.

2013 **3rd year Genetics Project**, *Investigation of gene duplication using protein interaction networks in Mycobacterium tuberculosis*, UCT Health Sciences Department (Computational Biology Group), Supervisor: Nicola Mulder.

2013 **3rd Year Mathematics Project**, *Neuromanifolds - Applications of Information Geometry in the Study of Neural Networks*, UCT Mathematics Department, Supervisor: Jeff Murigan.

Computer Skills

Basic HTML, Java, C++, Git

Intermediate ImageJ, Vaa3D, Commandline Linux & Bash

Confident Python, MATLAB, R, LaTeX

Experience

Scientific & Teaching Experience

Nov 2019 **Assistant Conference Coordinator**, Luminous Workshop, Assisted organizers in running the Luminous Consortium's Public Engagement and Conference events on the Neuroscience of Consciousness.

Oct 2018 - Pres. **Statistics Tutor & Teaching Assistant**, OU, 4^{th} Year: Topics in Computational Biology, Statistical Analysis of Networks.

Jan-Jun 2016 **Research Assistant**, SU Department of Mathematics, Further developed theory from BScHons thesis with Prof Cang Hui and Dr Petro Landi. Duties including tutoring undergraduate students and the preparation of a manuscript for publication.

Jan-Jun 2016 **Senior Head Mathematics Tutor**, SU Department of Mathematics, 1^{st} Year; 2^{nd} Year: Engineering, Foundations.

Nov 2013 - Jan 2014 **Student Research Intern**, UCT Computational Biology Group, Phylogenetic Tree Construction and Ortholog Functional Analysis, Supervisor: Nicola Mulder.

Additional

Oct 2018 - Jun 2019 **Language Student**, OU Language Centre, Completed Stage 2 course in written and spoken Mandarin Chinese.

Oct 2018 - Pres. **Volunteer**, OU Museum of Natural History, Working together with other volunteers in the *Move a Million Project* to count and catalogue the museum's vast insect collection.

Feb 2017/8 **Competitor**, British University Championships (BUCS), Oxford Men's 1^{st} Team in the BUCS Karate Tournament.

Feb-Oct 2013 **Volunteer Mentor**, UCT Students Health and Welfare Organisation, Mentored Grade 10 students to ready promising, underprivileged students for university education.

Languages

English **Mothertongue**

Afrikaans **Intermediate**

Mandarin **Basic**

Interests

- Phylogenetics & Evolution
- Neuroscience of Consciousness
- Theoretical Ecology & Epidemiology
- The Computational Brain