



Thematic Research Training 2020-2021

Integrated Health group

Chair: Dr Jo Stevens (University of Edinburgh)

Session 1: Programming skills for dealing with your data (using R, PYTHON. MATLAB) - 13 January 2021, 12:00–17:00

Session organisers:

- Josh Richards at 2435501@dundee.ac.uk
- Dr Henry McSorley at hmcSorley001@dundee.ac.uk

Session Description

The session aims to introduce EASTBIO PhD students to various coding / programming software available, which may benefit their PhD projects. We will have accomplished scientists discussing coding and its benefits to biologists, as well as fellow students who have benefited from learning a coding language themselves.

Session requirements:

Download R before the session – instructions circulated in the group.

Session Schedule:

Times	Sessions
12:00 – 12:15	Introduction and Outline of session Josh Richards / Dr Henry McSorley
12:15 – 13:00	Dr Al Ivens – An introduction to coding for biologists University of Edinburgh
13:00 – 13:15	Student Talks – Learning Python for your project’s bioinformatics needs Emma Hobbs @ University of St Andrews
13:15 -13:30	Screen break
13:30 – 13:45	Student Talks – R for Statistical Analysis Jamie Weir @ University of Edinburgh
13:45 – 15:30	Coding Exercises in R – Session run by Professor Stephen Hubbard (University of Dundee) Students grouped into breakout rooms – mentors can circulate rooms to provide help if needed.
15:30 -15:45	Screen break
16:00 – 16:15	Student Talks – Designing a public engagement game’ coding with Scratch –Anastasia Leligdowicz @ University of Aberdeen
16:15 – 16:30	Student Talks - Python for big data Vivien Shek @ University of Dundee
16:30 – 17:00	Summary: intended outcomes’ good resources’ future directions’ help going forward, etc. Josh Richards / Dr Henry McSorley

Session 2: Using animal models in research - 19 February 2021, 10:00-16:00

Session organisers:

- Andreas Kolb (Aberdeen)
- Tatiana Dovgan <t.dovgan.20@abdn.ac.uk>

Session Schedule:

Times	Sessions	Notes
10.00–10.05	Introduction	
10.05–11.00	Health group catch-up – each of 12 students to briefly recap their projects or give a brief progress update (max 4 minutes)	Email beforehand to request 1-2 slides per person
11.00–11.50	“Alternatives to animal models and the 3R” by Dr Donna MacCallum (Institute of Medical Sciences, University of Aberdeen) Q&A and discussion	Confirmed speaker
11.50-12.05	Coffee break	
12.05-13.00	“Using Zebrafish in Research”, plus discussion about NC3R by Professor Neil Vargesson (School of Biological Sciences, University of Aberdeen) Q&A and discussion	Confirmed speaker
13.00-14.00	Lunch break	
14.00-15.00	Neil Reavey (Associate Director, Research Assurance, AstraZeneca) Talk about industrial perspectives on using animals research 45 min presentation plus Q&A	Confirmed speaker
15.00- 16.00	“Using Mice Models to Study Ageing” by Dr Sharon Mitchell (School of Biological Sciences, University of Aberdeen) Q&A and discussion Closing remarks	Confirmed speaker

Session 3: Use of AI in the sciences: Where are we headed? An interactive workshop at the University of Edinburgh - 9 April 2021, 10:00-15:30

Session organisers:

- Samuel Gibbon samuel.gibbon@ed.ac.uk
- Somya Iqbal S2119622@ed.ac.uk

Order of events

10:00 – Overview - Professor Manuel Trucco

10:45 – Padlet – Participant interaction

11:00 – Live demonstration by Samuel Gibbon

11:30 – Speaker 2 – Dr Emma Pead

12:15 – Screen break

12:30 – Speaker 3 – Professor Giovanna Tinetti

13:15 – Lunch break

14:00 – Speaker 4 – Dr Paul De Sousa

14:45 – Panel discussion with: Professor Guido Sanguinetti, Dr Oisín Mac Aodha & Dr Marta Vallejo chaired by Somya Iqbal

15:30– End

Programme in depth:

Speaker abstracts

Professor Emanuele Trucco

Title: a crash course introduction to deep learning

Purpose, building blocks, examples of life sciences/medicine problems that have been solved successfully, how to get started for people with no computer science background.

Affiliations: University of Dundee

Dr Emma Pead (University of Edinburgh)

Title: What's in your eye?

The meteoric rise in retinal imaging technologies and digital analytic techniques, such as AI, have the potential to transform eye care across community and hospital services by providing new insights into ocular, systemic and neurodegenerative diseases. For ocular diseases this includes the development of automatic early detection techniques to aide in patient stratification and progression monitoring. For systemic and neurodegenerative diseases this includes the application of AI systems for risk prediction and biomarker discovery. We will explore the application of AI to a challenging task in ophthalmology, lessons learned and how AI is helping to unlock the potential of the retina as a window to body and brain health.

Professor Giovanna Tinetti (University College London)

Professor Giovanna Tinetti is a Professor of Physics and Astronomy at the University College of London (UCL), and part of the Exoplanets research group. The term "exoplanet" is used to describe planets orbiting stars other than our own.

Professor Tinetti works on galactic planetary science, trying to understand the chemical composition of planets in our galaxy, how they form and evolve and why they are so diverse. Understanding the formation of planets elsewhere in our galaxy allows us to understand more about our own planet and solar system, as well as the history of the galaxy. Her work uses AI to understand exoplanet and she will be sharing her work in this area.

Dr Paul De Sousa (The University of Edinburgh/ Massive Analytic)

Title: Artificial Intelligence in Biomedical Discovery Supporting Innovations in Personal and Societal Health and Welfare

Artificial Intelligence and its application to Big Data and the Internet of Things promises new opportunities to gain insight, prediction and control of discovery, production and delivery of

innovation. Over the last decade this has progressed from machine learning and detection of features not apparent or readily accessible to unassisted human assessment to the development of dynamic and interpretable models based on the fusion of multi-parametric data across all domains of life and industry. In my presentation I will focus on the evolution of its application in biomedical discovery of animal development pertinent to future innovations in the diagnosis, tracking and treatment of disease. Stepping back from early prophetic ambitions for AI to find answers for the “meaning of life, the universe and everything”, there have been tangible successes understanding animal and human development and preservation of health to inform the scope of the challenge and clarify the routes to making impactful changes in how to improve individual and societal health and welfare.

Panel member profiles

Professor Guido Sanguinetti

Professor in the Institute for Adaptive and Neural Computation at the School of Informatics, University of Edinburgh. My interests focus on probabilistic modelling of biological systems, with particular emphasis on inference in dynamical systems.

Dr Oisín Mac Aodha

Dr Mac Aodha is a Lecturer (Assistant Professor) in Machine Learning in the School of Informatics at the University of Edinburgh. His current research interests are in the areas of computer vision and machine learning, with a specific emphasis on human-in-the-loop methods such as machine teaching.

Dr Marta Vallejo

Dr Marta Vallejo is a Tenure Track Research Fellow in Biomedical Signal and Image Processing in the Institute for Sensor Signals and Systems at Heriot-Watt University. She is also part of the ICT-Robotic for Independent Living Testbed, a ‘Living-Lab’. Her current research activities focus on the application of machine learning techniques, including deep learning and evolutionary algorithms, to neurodegenerative diseases. She is particularly interested in the processing of biomedical signals and images and the creation of biomedical classifiers.

Live demonstration by Samuel Gibbon

We will fine-tune a pre-trained state-of-the-art convolutional neural network to classify images. We will ask you to think of something to classify, e.g. facial expressions, breeds of a certain animal, cells, leaves. We will download the images (150 of each category) using Microsoft Azure, and train in Python using fastai, which is built on top of PyTorch. Next, we will use the model to predict the category of a brand-new image. If there’s time, we’ll put the trained network into production, e.g. build a mini-website. Everything presented is taken directly from the fastai course, as taught by Jeremy Howard and his colleagues, which I highly recommend.

Organisers:

Somya Iqbal

EASTBIO PhD candidate working on Artificial Intelligence Mediated Discovery and Bio-validation of novel regulators of nervous system stability.

Age related decline and neurodegeneration are growing issues around the world and some of the characteristic markers of this decline are centred around neuronal vulnerability and dysfunction in

specific brain regions. This vulnerability impacts the nervous system and disrupts its stability, therefore understanding which factors contribute to the regulation of the nervous system is of paramount interest. Whilst previous work in the field identified neuronal cell death as the cause of cognitive decline, it is now understood that specific compartments of the neuron can be differentially vulnerable and affected in both healthy age related decline and in neurodegenerative diseases namely the synapse, axon, and the cell soma. The synapse in particular has been implicated in a wide range of conditions since vulnerability in this compartment shows early signs of disruption in pre symptomatic conditions, making it a prime pathological target. Therefore, it is important to investigate synaptic health in pre symptomatic as well as symptomatic conditions to create better maps of the mechanisms involved in this vulnerability and target disease at an early stage. Thus, my project will work with data collected from the synaptic proteome and investigate which molecular targets are involved in synaptic health within normal healthy ageing and disease contexts. The project will build on this by refining the methodological approach of identifying relevant proteomic targets by using an AI tool provided by Massive Analytic: <https://www.massiveanalytic.com/>.

Samuel Gibbon

EASTBIO PhD student. Based in the Centre for Clinical Brain Sciences, I am working with retinal and MR images to help explain cognitive and health outcomes in the Lothian Birth Cohort, a group of elderly participants living in Scotland. Our aim is to help characterise the biological correlates of healthy and pathological ageing in the retina and brain.

Session 4: Science Communication & Public engagement - 25 June 2021, 10:00-16:00

Session organisers:

- Ailish Tynan A.C.Tynan@sms.ed.ac.uk
- Lucja Kostrzewa lucja.kostrzewa@ed.ac.uk

Session Description:

How we as scientists communicate our research to other people – whether that be other scientists or the public is hugely important. In this thematic meeting we hope to showcase the huge variety of opportunities available to us as PhD students to become involved in Public Outreach and how to effectively communicate the science we are passionate about to the wider world.

Session Schedule:

Times	Sessions
10:00-10:10	Introduction to meeting
10:10-10:55	Dr Janet Paterson Science Communication and Public Engagement: Some Things to Consider
10:55-11:20	Ellie Roger Community Science Engagement at Edinburgh BioQuarter
11:20-11:30	Screen Break
11:30-12:15	Dr Jane Haley Engagement vs impact, what's the difference?
12:15-13:00	Dr Antonis Asiminas So many public engagement opportunities but so little time
13:00-14:00	Lunch Break
14:00-14:45	Richard Fitzpatrick Neuron Safari – Using Minecraft to Explore Biological Concepts

14:45-15:45	Student Flash Talks and discussion Kiani Jeacock – University of Edinburgh Dagmar Der Weduwen – University of St Andrews Daniel Underwood – University of Aberdeen Phil Butlin – University of Edinburgh
15:45-16:00	Closing Remarks
16:00	End of seminar

Speaker Details

Dr Janet Paterson (she/her) Public Engagement Manager, School of Biological Sciences, University of Edinburgh

A former research scientist, Janet coordinates a variety of projects which support Biologists to engage publics with their research. With a focus on reaching socioeconomically deprived and underrepresented audiences, these include curriculum-linked biotechnology workshops for senior school pupils, science festivals and related activities, and community engagement projects. Janet trains and mentors researchers in public engagement, and lectures in Science Communication.

Ellie Roger Community Engagement Officer, Edinburgh BioQuarter

Ellie joined the Edinburgh BioQuarter team in 2020 to support the award-winning community engagement project. She is also the Communications and Engagement Officer at the University of Edinburgh's Centre for Regenerative Medicine, a medical research centre located at the BioQuarter. Ellie has over ten years of experience working in communications, events and stakeholder engagement for the charitable sector.

Edinburgh BioQuarter has established an award-winning community engagement project, building connections with its neighbouring communities of Craigmillar, Niddrie, Moredun and Gilmerton. The aim of the project is for these areas to benefit directly from their location and access to top researchers, clinicians, students, scientists and entrepreneurs.

Dr Jane Haley Edinburgh Neuroscience Coordinator

Since 2006 Jane Haley has been the Scientific Coordinator of Edinburgh Neuroscience, a university-wide interdisciplinary organisation which brings together over 500 researchers based in over 180 laboratories.

Talk Description: You love your research but will others be interested? We will think about your work and how to make it engaging for others. Plus, do you keep hearing about 'impact' and wonder if this is something you should be thinking about? We'll explore the difference between impact and engagement.

Dr Antonis Asiminas (he/his) Postdoctoral Researcher, University of Copenhagen

Since 2013 I have participated in and led a number of public engagement activity. From 2012 to 2016 I did my PhD in Edinburgh and I stayed in Edinburgh as a postdoctoral researcher until last April. I am now a postdoctoral Researcher at the University of Copenhagen.

Talk Description: I will talk about my experience with public engagement while being a PhD student and postdoc in Edinburgh, and why I found it rewarding and helpful for my research.

Richard Fitzpatrick (he/his) Curriculum Developer, School of Biological Sciences, University of Edinburgh

Whilst studying Neuroscience at Edinburgh as an undergrad, I began work in Prof Richard Morris' lab working on animal behavioural tasks related to schema formation and everyday forms of memory. I continued this work for two years post-graduation, before completing a MSc in Cognitive Science where I worked on the philosophy of memory. In 2016 I began my PhD in the Stefan lab exploring large-scale modelling of biochemical signalling networks associated with synaptic plasticity,

specifically looking at AMPA Receptors. My PhD was partially vocational, which offered me the opportunity to undertake teacher training and led to me applying in 2019 for the Principal's Teaching Award Scheme, which allowed me to begin my exploration into using game-based learning as a way of educating people on complex biological concepts. I currently work as a Curriculum Developer, helping design five Biotechnology Masters programmes for use at a brand-new University being set up in Gujarat, India, with the help of the University of Edinburgh.

Talk Description: I will present my experiences and reflections on using Minecraft as a tool for public engagement within biology, and how this was adapted to fit with asynchronous, remote science communication during the pandemic. I will also sketch out a new venture for using Minecraft for citizen science, which is being designed in collaboration with Dr Antonis Asiminas.