University of Reading

INTERNATIONAL UROP PROJECT PACK 2020

Delivered by University of Reading Careers and Erasmus & Study Abroad teams

What is International UROP?

The Undergraduate Research Opportunities Programme (UROP) offers undergraduate students the chance to gain hands-on research experience on projects covering all disciplines across University.

The scheme provides exciting opportunities to work on real research projects alongside academic researchers at the University of Reading. Our research projects last six weeks over the summer break, and offer students the chance to gain research experience whilst also developing key transferable skills for the future.

When will it take place?

All projects will take place between Monday 22nd June and Friday 31st July 2020. Students will need to arrive in Reading (UK) for an induction day on Friday 18th June.

Can I apply for projects outside of my discipline?

Yes, the majority of projects are open to any students. Some may have requirements for specific skills but we would recommend that you look over all the projects and make applications to any that may be of interest to you.

Where will the projects take place?

The projects will be hosted by academics at the University of Reading, in the UK.

How do I apply?

All applications must be made through the below link: http://bit.ly/382u6ub

Once you have completed this form you must also send your CV and transcript to urop@reading.ac.uk and studyabroad@reading.ac.uk. Your application will not be considered as complete until all documents have been received.

Will I get the chance to meet the supervisor?

We will try to arrange for a meeting over Skype between you and the supervisor if you are successful in your application.

What projects are available?

Projects are available in a wide range of research areas. Please see the page below for links to the research areas covered.

Each project is valued at 15 ECTS. In order to receive the academic credit students must complete all requirements of the project including the research (as outlined by the supervisor) and assessments (presentations and written work),

Students are expected to undertake the research during standard office hours – 09:00 to 17:00 (excluding lunch break), Monday to Friday, for the duration of the project. Evening and weekend work will be required in the preparation of the assessments.

Contact for questions

If you have any questions please forward these to urop@reading.ac.uk and studyabroad@reading.ac.uk.

PROJECTS AVAILABLE

Agriculture

- Aphids in fields: establishing the spatial distribution of important crop pests
- Lipases and lipid digestion
- Raspberry pollination: Bees and their benefits to berries.
- Does available P in soil indicate true soil P status on UK Dairy Farms?

Business and Law

- Understanding the role of complexity in service modularity and new service introduction performance.
- Does Women Ownership Make a Difference in Developing Countries? Understanding the Gender Effect on Firm Growth.
- Interventions for successful ageing at work: A Systematic Review of the Literature
- Safeguarding Children with Disabilities
- The UK's law and policy framework for the promotion of gender equality in the world: with power comes responsibility?

Classics, History and Education

- Off limits? The neglected history of fences, walls and hedges
- The ancient soundscapes in the Ure Museum
- Higher Education Leadership gaps - understanding the underrepresentation of women and BAME groups in professorial and senior leadership roles
- A systematic review of the literature on the use of additional language teaching for integration of migrant children (EAL included) in their hosting communities.
- The effect of using a reading app on beginner reading performance and use of reading strategies.
- Engagement and Integration: How home students and international students work together in group work assignments and the role language plays in their interactions

Computer Science and Meteorology

- Information Visualisation of Massively Complex Data
- Exploring parallel programming languages for climate and weather
- Relationship between the Northern-hemispheric temperature gradient and Sahel rainfall: historical changes and future evolution
- Human drivers of observed changes in the West African Monsoon.
- Exploring the use of high-resolution climate models to simulate European energy variables and their future projections

Psychology

- Seeing a visual world
- Anhedonia and Adolescent Depression
- Exploring experiences of students with a specific learning difficulty at the University of Reading
- Can a high flavonoid diet improve mothers' mental health in the immediate postnatal period?
- Investigating the Representation of 3D Scenes in Moving Observers
- Neural basis of emotion processing in running speech, vocal music and instrumental music in Autism Spectrum Disorder (ASD)
- Effects of decision pre-commitment on learning from experience

Archaeology, Geography and Construction

- Impact of organic fertilisers on volatile organic compound (VOC) emissions in tropical soils
- Improving the resilience of soils to extreme weather
- Digital Archaeology for Medieval Funerary Heritage
- Geography's History
- Modification of the local microclimate by clusters of trees
- Classification of wind power ramp events

Biological Sciences

- Characterizing the impacts of insect herbivory on the rhizosphere microbiome of plants.
- The impact of dementia on social behaviours: simple model for a complex question
- Development of a Polio Virus-Like Particle Vaccine in Escherichia coli
- Determining the presence of bacteria associated with tree diseases in samples from wild birds
- Innovative delivery of imaging probes into human platelets to investigate platelet function

Chemistry and Pharmacy

- Developing novel mucoadhesive polymers for drug delivery
- Protocol development for the novel use of a crystallisation robot tailored to suit early stage drug discovery
- Developing pharmacological resources
- Citizen science: enlisting people help us evaluate the real magnitude of medicinal waste and disposal practices

Economics

- Measuring international flows of waste electrical and electronic equipment
- Women in Football
- The impact of football clubs on the local area

AGRICULTURE

Title: Aphids in fields: establishing the spatial distribution of important crop pests

Project Summary

Feeding billions of people whilst reducing farming's impact on our environment is an important question facing both academia and agriculture. It is widely recognised that the way we farm and manage our land can have negative impacts on our ecosystems. If we are to reduce harm, there needs to be evidence of how to improve our farming practices on a commercial scale. This UROP placement fits into a series of large-scale experiments on farms across the UK which are exploring this problem. This UROP project will take place alongside EU project EcoStack (https://www.ecostack-h2020.eu/), a UK project ASSIST (https://assist.ceh.ac.uk/)and a Waitrose/Industry funded PhD, and therefore allows the student to learn about academic research can influence agriculture. The aim of this placement is to develop GIS maps of the in-field spatial distribution of crop pests. In particular, aphids will be studied to see how their numbers vary across carrot fields. The student will process carrot foliage samples, removing any aphids for further identification. If the student is interested, they can also take part in fieldwork to collect samples. The student will gain an understanding of different ecological sampling protocols as well as a range of field-based techniques that can be used to assess insect communities. The student can visit commercial field-trials with an opportunity to work with other researchers and farm managers.

Project supervisor(s): Prof Simon Potts and Hananah McGrath

What will the outcomes of the placement be?

Student outcomes:

- Identification of crop pests - Knowledge of field trial design, sampling and management - Knowledge of ecosystem service measurement - Better understanding of horticulture sector and agronomy - Experience working between science/academia and industry - Use of geostatistics, GIS software or other appropriate metrics to look at insect communities

What tasks will the student undertake?

The student will be working under the supervision of a PhD student (Hannah McGrath) and with any other relevant staff (e.g. Rothamsted field entomologists). The following tasks will be carried out, supported by high quality training: Lab/office work - Processing samples to find and identify if crop pests, in particular aphids, are present, developing insect taxonomy skills - Developing and maintaining recording sheets to manage data - Data processing and analysis before presenting data (statistical and presentation skills) - Use of microscope to check samples Fieldwork: - Visiting other fieldwork sites on commercial farms (conducting research in real world settings)

What skills/knowledge/experience will the student need?

Qualifications: - In the process of acquiring a degree in a related subject i.e. agriculture, ecology, environmental management, biology etc. Essential Skills and Knowledge: - Some field or lab work experience - Ability to follow protocols - Attention to detail - Ability to work independently (but as part of a team) - Basic knowledge of entomology, and experience with identification or study of insects is desirable but not essential.

AGRICULTURE

Title: Lipases and lipid digestion

Project Summary
The student will participate to activities from the working group 4 (WG4) of the COST Action Infogest (Improving Health Properties of Food by Sharing our Knowledge on the Digestive Process). During this project, the student will learn how to measure lipase activity and use the Infogest in vitro model of digestion to assess the lipid digestibility of food products.

Project supervisor(s): Myriam Grundy

What will the outcomes of the placement be?
Student outcomes:

At the end of the placement the student will gain practical experience in biochemical assays to measure lipase activity, vitro digestion, and microscopy. In addition, the student will develop skills of team-work, independent learning and scientific writing. These transferable skills will increase the employability of the student.

What tasks will the student undertake?
Under the supervision of Dr Myriam Grundy, the student will assess the activity of a range of lipases (gastric and pancreatic) using a standard method. Then, a food product (e.g. infant formula) will be digested using the Infogest gastrointestinal model of digestion. Based on the student progress, there will be the possible of performing microscopy examination of the digested products.

What skills/knowledge/experience will the student need?
The student will have an interest in biochemistry, enzymology and nutrition. The student needs to have experience and be capable in the laboratory (e.g. pipetting, preparing solutions). Key attributes are ability to work independently and to manage own time.

AGRICULTURE

Title: Raspberry pollination: Bees and their benefits to berries.

Project Summary

During this placement the student will be based in the Centre for Agri-Environmental Research (CAER) within the School of Agriculture, Policy and Development. The student will be working alongside ecologists in the field of pollination ecology and entomology. This placement will be part of a larger project working to better understand the role of the ecosystem services of pollination and pest regulation in UK raspberry crops in order to support more sustainable production. The aims of the placements are to gather a key dataset for the project on what pollinators are visiting raspberry crops during the 2020 crop flowering season. The placement will involve collecting data on insects visiting raspberry flowers across different fields in southern England for the critical second season of this project. During May to July when raspberry crops are in flower the student will carry out transect surveys to assess the abundance and diversity of insect pollinators visiting flowers and how this varies between farms and different local pest control practices. The placement student will work alongside the current project student and will be fully trained and supported to carry out the methods. They will gain experience working on commercials farms, collecting and identifying bees and other insects as well as data entry.

Project supervisor(s): Michael Garratt

What will the outcomes of the placement be?

Student outcomes:

This placement offers the opportunity to work in the Centre for Agri-Environmental Research with a leading group of agro-ecologists with a particular focus on bees and crop pollination. The placement will provide experience working on commercials farms, implementing a number of ecological field techniques and collecting and identifying bees and other pollinators. The placement will provide great experience for a future research or industry career in applied ecology or pollination.

What tasks will the student undertake?

This placement will involve carrying out pollinator surveys in flowering raspberry crops. They will be fully trained in carrying out 'Transect' and 'Timed observation' surveys and gain experience identifying bees and other insect pollinators to broad taxonomic groups in the field. They will also gain experience carrying out pollination manipulation trials and assessing impact on crop quality.

What skills/knowledge/experience will the student need?

Some experience of insect identification is desirable but not essential. Knowledge and enthusiasm for bees and pollination ecology is also a plus. Willingness to travel with the project manager to local field sites and do occasional long days of fieldwork outdoors is essential.

AGRICULTURE

Title: Does available P in soil indicate true soil P status on UK Dairy Farms?

Project Summary

In recent years diffuse phosphorus (P) loss from concentrated animal holdings has received great attention as a major contributor to water quality degradation and reduced aquatic biodiversity (i.e. eutrophication). Efforts in the UK have successfully reduced P fertiliser inputs into soil but to further minimise the accumulation of P in soil, we now need to reduce manure P inputs. Efficiently handling this P-dense manure without aggravating spatial imbalances in soil P is a challenge because of increasing concentrations of production per unit of land available and stores of legacy P in soil due to previous heavy fertiliser use, Therefore, DEFRA has recently suggested to consider soil Olsen-P before land application of manure. Olsen-P is a good indicator of P available to crops, but it does not consider slow release of P from legacy P pool in soil and thus fails to address the issue of P loss from soil to waterbodies. The issue of on-farm P surplus and subsequent environmental P loading could be tackled by developing and implementing best practices that will consider not only Olsen-P but also P from legacy P pool (total P). This project aims to determine the relationship between Olsen-P and total P (legacy P) to answer the question: 'Should Olsen-P be used as a sole indicator of potential P loss from soil?'

Project supervisor(s): Partha Ray

What will the outcomes of the placement be?

Student outcomes:

This placement will allow the student to develop both transferable and research-specific skills. The student will develop a broad range of strong research skills, such as reviewing scientific literature, use of wet chemistry technique to quantify total P content of samples, dataset preparation for statistical analysis and statistical analysis of data. The student will undertake research across multiple disciplines (e.g. animal science, soil science, and statistical analysis) and thus will have the opportunity to gain a set of multi-disciplinary employment skills. These include research, team-working, independent learning and working, time-management, report writing, organisational, problem solving, communication, analytical (laboratory-based) and statistical competencies. Work experience in a research environment as well as co-authorship of future publications will add value to the resume of the student for both academic and industry career path. To ensure accomplishment of set targets by the end of this placement, the student will be encouraged to prepare and maintain a daily and weekly task completion schedule.

What tasks will the student undertake?

The student will use the Acid Digestion of Plant Material (Allen et al.) method to prepare samples of feed, manure and soil collected from dairy farms across the UK for determination of total P content. The student will then quantify the total P content of the prepared samples using the SKALAR total phosphate automated analyser. Samples will also be analysed for Olsen P. The student will work under

the supervision of Dr Partha Ray, PhD student Brad Harrison and with laboratory technicians from both the School of Agriculture, Policy and Development and SAGES. Specific tasks will include gaining theoretical knowledge by literature review, performing laboratory analyses and data processing and statistical analyses. Week 1: Literature review to become familiar with the cycling of P throughout a dairy farm (including within the cow and the soil), understand the protocol of analysing samples to determine total and Olsen P content and gain knowledge on the parameters which will indicate a reliable representation of soil P status while determining potential soil P loss. Week 2-5: Lab analysis training and lab analysis. Week 6: Data organisation and processing required for statistical analysis; statistical analysis of data using statistical software (e.g. Minitab). All samples and research components will be available before the start of the project.

What skills/knowledge/experience will the student need?

The student should have an interest in agriculture, animal science and soil science. The student should have good analytical skills or should be able to learn wet chemistry techniques quickly. The student will be expected to organise and analyse data, and interpret results and thus should have good knowledge of MS Excel and Word, and statistics. The student should be able to work independently and as part of a team. The student should have very good time-management and organisation skills in order to achieve targets by the set timeline.

BUSINESS

Title: Understanding the role of complexity in service modularity and new service introduction performance.

Project Summary

This project aims at understanding the effect of service modularity on new service introduction performance. In addition, the project will investigate the moderating role of complexity on modularity and new service introduction performance. Adapting a study conducted by Vickery et al (2015) in the manufacturing industry, this study focusses on the service industry where little research around modularity and new service introduction performance has been conducted. To this date, anecdotal evidence has been provided at best. The study will empirically examine the relationships between service modularity and new service introduction performance and whether an objective measure of complexity moderates this relationship. A survey methodology is employed and probes service organisations of simple and complex service products. The data will be collected prior to the student undertaking the project. The main focus of the student's activities will be analysing this dataset and contributing toward the development of a research article (the student will be a named author on the output) and poster. The project will task the student to conduct confirmatory factor analysis and hierarchical regressions to test the hypothesis concerning the main effects of service modularity and the effects of its interaction with complexity on new service introduction performance. The implications of the findings produced by the student's analysis will contribute to advances in the field of service modularity and its effect on specific facets of new service introduction performance (e.g., frequency of new service introduction, service development lead times etc). The student will also be required to produce a poster showcasing the results. This research is part of a stand-alone research project.

Project supervisor(s): Philip Davies

What will the outcomes of the placement be?

Student outcomes:

The student will develop their quantitative data analysis skills. This includes developing their skillsets on SPSS/AMOS/R (the project is open to choice of analysis software used). In addition, the student will understand how to contribute toward and write a research article and produce a scientific poster.

What tasks will the student undertake?

The primary activity undertaken by the student will be quantitative data analysis on a pre-collected set of data. The student will be required to conduct confirmatory factor analysis (CFA) and hierarchical regression modelling to test the hypothesis.

What skills/knowledge/experience will the student need?

The following skills are required (essential) for the project: - A good understanding of quantitative data analysis (including regression modelling). - Reasonable knowledge of SPSS/AMOS/R (only one is required). The following skills are desirable (but not essential): - Experience in presenting research/essays to colleagues/other students. - A good understanding of scientific writing.

BUSINESS

Title: Does Women Ownership Make a Difference in Developing Countries? Understanding the Gender Effect on Firm Growth.

Project Summary

With several myths surrounding the gender effect in entrepreneurship, this study will be attempting to look deeper into some of the assumptions feminist theories hold about female entrepreneurship in the developing countries context with a view to providing clarity on them. For instance, some studies have shown that feminist theories do not always hold for developing countries and that firm age, rather than access to finance is an impediment in productivity for women-owned firms. To this end, this project aims to investigate the gender effect of firm performance in the emerging economies context by asking: Do women-owners in emerging economies do better in growing their firms?

Project supervisor(s): Dr. Adeyinka Adewale

What will the outcomes of the placement be?

Student outcomes:

1. Query research databases 2.Structure a systematic literature review 3. Analysing alternative theoretical perspectives 4. Writing a journal standard piece of work

What tasks will the student undertake?

Research database search Sorting and categorising of relevant studies Summarising key approaches and findings. Writing a literature review document

What skills/knowledge/experience will the student need?
1. Basic ability to carry out online search 2.Summarising key ideas and thoughts in an academic article 3. Writing a critical academic piece.

BUSINESS

Title: Interventions for successful ageing at work: A Systematic Review of the Literature

Project Summary

The workforce is getting older (Zacher, Kooij, Beier, & Wang, 2018) and more age diverse (Truxillo, Cadiz & Hammer, 2015). Debates on the social and economic impacts of ageing and the importance of extending the working life (Zacher et al., 2018) have led to an increased interest in ageing at work and the promotion of successful ageing (Truxillo et al., 2015). This is especially important in occupations with potential staff shortages or early retirement practices (ex. Healthcare). In the work domain, successful ageing can be defined as growth or maintained positive outcomes in the light of increased age (Kooji, 2015; Zacher, 2015). The notion of workability (Ilmarinen, 2009) was linked to the idea that adjusting the demands of work, by considering ageing concerns, should help to extend the working life. The literature on fuller-working lives (Phillipson, 2019), emphasises the importance of healthy ageing as an important factor in increasing the quality of working lives of older workers as well as extending them. There is evidence that individual and organisational factors contribute to successful ageing at work (Truxillo et al., 2015) and this project therefore aims to review the available literature to identify and evaluate different successful ageing interventions with the aim of informing management research and practice.

Project supervisor(s): Dr Tatiana Rowson

What will the outcomes of the placement be?

Student outcomes:

The successful student will develop literature review skills and critical analysis skills (from conducting the systematic literature review) and an understanding of successful ageing at work interventions.

What tasks will the student undertake?

The PI and 2nd supervisor will guide the student who will conduct a systematic literature review. The steps include an identification of key words for the literature search, a selection of academic sources and databases, a definition of inclusion criteria, the selection of articles, an analysis of the articles selected and a draft of a paper. In all stages the student will be supervised and supported by the PI who will ensure the quality of the literature review outputs and student learning.

What skills/knowledge/experience will the student need?

No prior knowledge is required. Good writing skills are desirable as well as an interest in successful ageing at work, Psychology, Organisational Behaviour or Human Resources Management

LAW

Title: Safeguarding Children with Disabilities

Project Summary

The placement will involve mapping the laws on child safeguarding and on children with disabilities across 10 case study countries. The student will work with the PI and with the NGO project partner, following the research methodology to gather and analyse the data.

Project supervisor(s): Professor Rosa Freedman

What will the outcomes of the placement be?

Student outcomes:

The student will learn about child safeguarding, and be part of a project team undertaking an initial pilot study.

What tasks will the student undertake?

The student will undertake independent research for the mapping of national laws, overseen by the PI.

What skills/knowledge/experience will the student need?

Independent research skills Knowledge of law or related discipline.

LAW

Title: The UK's law and policy framework for the promotion of gender equality in the world: with power comes responsibility?

Project Summary

This placement investigates how the UK's international and domestic legal obligations related to the protection and promotion of gender equality shape the UK's legal framework for external action, external policies and international treaty-making. The research is based in the fields of international and UK law related to gender equality. Foreign affairs are subject to a high level of political discretion and the dynamic development of global challenges, but decisions are not taken in a legal vacuum. What are the implications of the UK's international legal obligations and objectives (eg CEDAW, Sustainable Development Goal 5) and domestic law on gender equality for the UK's legal and policy framework for external action? How do gender equality commitments affect the UK's different external policies/action and treaty-making (eg development, security, trade)? What, if any, is the role of parliament and judiciary in ensuring that external action complies with such international legal obligations and domestic legal standards? The placement is part of the supervisor's project in the field of comparative foreign relations law, involving experts of constitutional and foreign relations law from a variety of civil/common law jurisdictions (eg France, Germany, Italy, New Zealand, Switzerland, UK, US) and the EU to explore the link between external action and the tackling of gender inequality in the world.

Project supervisor(s): Anne Thies

What will the outcomes of the placement be?

Student outcomes:

As a result of the project, the placement student will develop an understanding of the research process – invaluable for any student planning to undertake a large research project in the future (e.g. a final year dissertation, PGT/PGR studies). S/he will develop skills needed to undertake a thorough literature review to uncover, collate and assess, primary legal material (international treaties, domestic law) and policy documents. Authorship in relation to the article will remain with the PI. Over the course of the placement the student will gain knowledge of an important area of UK foreign relations and equality law, including both substantive and procedural law as well as related practice. Having worked on a project that addresses current legal challenges should strengthen the student's capacity – and hopefully foster her/his interest! – to pursue further postgraduate studies and research, possibly under the supervision of the PI. At the same time, the student will gain experience in completing different steps in the research process: identifying relevant law, cataloguing regulatory approaches and searching for relevant policies and outcomes as well as reviewing related literature. Completing these different steps in the research process will also increase the student's awareness of common challenges when looking for, cataloguing and analysing relevant material – and collaboration with the PI will encourage and support the development of required skills to meet those challenges. Moreover, the student will strengthen her/his capacity to present both orally and in writing her/his findings in an appropriate way. Gained experience, skills and resilience will be valuable for the student's future research/professional activity.

What tasks will the student undertake?

The main tasks are summarised below: • Research, using library and online resources, UK's international legal obligations and domestic law/policy regarding gender equality and their (potential) impact on policy-making in general, and foreign affairs (including treaty-making) in particular (30%) • Identify, using library and online resources, at least one of the UK's external policy area (eg development, humanitarian

aid, foreign and security policy, trade) for a case-study on how gender equality considerations have shaped UK's external action and treaty-making (10%). • Focusing on the selected external policy area, collate and catalogue findings, with full references, in a format that allows simple comparisons to be made – e.g. equality provisions, provisions on institutions that undertake gender impact assessment, procedural law regarding the scrutiny of external action and request to challenge lack/insufficient equality/gender impact assessment, etc (30%). • Review relevant academic literature in law and reports relating to the implications of international and domestic law on gender equality for UK foreign affairs and provide an initial assessment of the regulation in terms of the UK's approach to gender mainstreaming and impact assessment – i.e. as a means of (a) promoting gender equality in the world, (b) enabling those (potentially) affected by external action to voice their concerns, and (c) ensuring that UK avoid practices, procedures and structures that infringe their international/domestic law obligations related to equality (20%). • Provide a note of sources (databases/on-line searches) researched and brief summary of any readings (1 page max per publication) undertaken (10%).

What skills/knowledge/experience will the student need?

Essential 1. An ability to locate, collate and organise research material from a variety of sources. 2. Good IT skills – especially re: online research. 3. An ability to critique and catalogue information in an accessible and well referenced manner. Desirable 1. An interest in doctrinal and comparative legal research as an academic discipline, particularly relating to international, EU and domestic equality law and its implications for (foreign) policy-making. 2. Good knowledge of UK public law.

HISTORY AND CLASSICS

Title: Off limits? The neglected history of fences, walls and hedges

Project Summary

Fences, walls and the divisions they seek to enforce seem to be an omnipresent feature of twenty-first century global geopolitics, from Donald Trump's Mexico-United States barrier to Brexit Britain's border controls and the EU's refugee crisis. While the vast majority of fences are much less newsworthy, they are one of the fundamental institutions in human history. Without fencing, livestock farming would be impossible and property rights unenforceable. Despite the profound significance of fences, however, they have received little attention from historians. This UROP placement aims to address this major gap in the literature by investigating the MERL's archival holdings, the richest collection of historical documentation on fences in the UK and possibly even in the world, yet one that has not yet been systematically examined and evaluated for this purpose. The Farmers Weekly photographic archive and the extensive trade catalogue collections are especially important here, along with the archives of the Council for the Preservation of Rural England, the Open Spaces Society among other collections. The project will seek to identify temporal and spatial variation in English fencing types, with a view to establishing a provisional regional typology relating to geology, vegetation and differing agricultural regimes, and to gauging key drivers of change including technological innovations (such as barbed wire and the electric fence) and changing agricultural practices.

Project supervisor(s): Dr Jeremy Burchardt

What will the outcomes of the placement be?

Student outcomes:

The student will develop key academic research and presentation skills including how to conduct a literature review; how to use EndNote; how to identify and assess relevant sources; how to analyze and interpret qualitative data; how to present a conference paper; and how to write an article for a refereed journal.

What tasks will the student undertake?

The successful candidate, supported by the PI and MERL staff (with whom this proposal has been discussed) will: (i) briefly review the historiography of fences, walls and hedges (15%); (ii) identify fence, wall and hedge archival sources in the MERL, focusing on trade catalogues and the digitized Farmers Weekly photograph collection (5%); (iii) survey these sources to establish their value for understanding the history of fences (40%); (iv) with the PI's assistance, develop a methodology for using the MERL's archival holdings to identify regional variations and change over time in fencing types (20%) and (v) co-write a conference paper for the British Agricultural History Society's annual conference (20%).

What skills/knowledge/experience will the student need?

The student must be studying for a degree in History, or a joint degree where 50% of the programme is in History. Good ICT and written communication skills are essential, and some knowledge of rural history would be an advantage.

HISTORY AND CLASSICS

Title: The ancient soundscapes in the Ure Museum

Project Summary

Ure Museum staff are working to develop an audio dimension to our Music and Materiality exhibit (first presented in 2018, with an online platform developed in 2019-20), which evolved in part from Dr Lloyd's successful PhD research. Using a new sound archaeology methodology, this work requires: 3D capture of ancient musical instruments (via photogrammetry); printing 3D models from which moulds can be made that enable the creation of authentic replicas of the originals; generating & recording the resulting sounds from these replica instruments. The UROP student will help the team with developing these new resources in sound archaeology and will then create interpretative materials (interlinked print and digital content) that present the resulting soundscapes to museum visitors and encourage their uptake via our existing social media platforms. Finally they will create, deliver & analyse user surveys, on the basis of which they can generate a publishable white paper on the implementation of audio interactives. Ure staff are developing an aural/soundscape trail with colleagues at the British Museum following the same principles employed in this project, yet on a much larger scale, given the size of that museum. This project therefore serves as an example for our BM colleagues regarding how to incorporate the results of research into an engaging sensory trail. This is therefore an exciting opportunity for a student to conduct cutting-edge research in sound archaeology and museology, through which they can develop practical skills as well as a broader understanding of the relevant academic fields.

Project supervisor(s): Prof. Amy C. Smith

What will the outcomes of the placement be?

Student outcomes:

3D visualisation skills, including photogrammetry & 3D printing; digital museology (i.e. how to reach audiences through web pages, recordings & other digital media), database experience, content development, object handling, designing, delivery & analysis of user surveys, preparing a publishable white-paper.

What tasks will the student undertake?

(1) Work with the team in capturing 3D scans of select instruments in the Ure collection (through photogrammetry) & creating 3D prints thereof, then generating & recording the resulting sounds from these instruments; (2) Create interpretative materials (interlinked print and digital content) introducing this work to museum visitors; (3) Contribute to the Ure's social media platforms to encourage audience interest in the soundscapes; (4) Create, deliver & analyse user surveys; (5) publishing a white-paper on the implementation of audio interactives.

What skills/knowledge/experience will the student need?

Required: general knowledge of ancient history, good digital and visualization (e.g. photography) skills; teamwork skills as well as the ability to work independently. Preferred: Familiarity with ancient musical traditions and/or the role of music in ancient cultures; experience performing and/or recording audio-visual material; social media skills.

EDUCATION

Title: Higher Education Leadership gaps - understanding the underrepresentation of women and BAME groups in professorial and senior leadership roles

Project Summary

On this placement you will work with a member of academic staff at the Institute of Education, London Road campus, to support a diversity and inclusion project, which includes a survey to: 1. Understand staff perceptions of leadership in higher education. 2. Explore the qualities, notable people and experiences that move staff forward and contribute to them advancing into leadership. 3. Investigate barriers to leadership. 4. Identify how staff are socialised and supported into leadership. 5. Identify important milestones on the path to leadership. 6. Compare and contrast responses according to gender and BAME characteristics. 7. Using the concept 'intersectionality' as the frame of interpretation, produce an intersectional analysis based on gender, race and ethnicity. You will have the opportunity to get involved in analysing the survey data (quantitative and qualitative), do literature searches and prepare written findings for publication and/or inclusion in PowerPoint presentations, workshop materials, etc.

Project supervisor(s): Dr Karen Jones

What will the outcomes of the placement be?

Student outcomes:

The placement will provide opportunities for learning about: * Research methods, data analysis techniques and software such as SPSS; * Rhe process of publishing and disseminating findings from research and why this is important. * Diversity issues in higher education, reasons for the underrepresentation of women and BAME groups in senior positions and leadership roles in universities and what can be done to address this.

What tasks will the student undertake?
To assist with the analysis of survey data, which includes quantitative and semi-qualitative responses (training will be provided) To create PowerPoint presentations and/other materials to disseminate the findings from the project (e.g. posters or workshop materials). To conduct a search of relevant literature and catalogue this in preparation for writing up publications. An opportunity to contribute to written publications.

What skills/knowledge/experience will the student need?
Good IT and maths skills are desirable. Experience of SPSS or excel spreadsheets would be helpful but not essential as training will be given

EDUCATION

Title: A systematic review of the literature on the use of additional language teaching for integration of migrant children (EAL included) in their hosting communities.

Project Summary

The European refugee crisis has presented with one of the greatest challenges in the past few years for Europe and individual hosting countries. The European Commission, United Nations, NGOs, individual volunteers and professionals across Europe joined forces to address the basic needs for accommodation and care of an increasing number of new arrivals every year. In the first instance they were concerned with providing safe passage and temporary health care for populations traveling to western countries. Researchers from different disciplines have shown an increasing interest in mapping provision, resources and care practices in Mediterranean countries (e.g., Turkey, Greece, Italy) to aid stakeholders in channelling available funding and resources and to inform migration policies. In the early days of response to the crisis, language teaching was often delivered in camps and repurposed settings. It regularly focused on teaching English to equip refugees with a globally spoken language. Recent strategic political decisions (e.g., EU-Turkey refugee agreement, 2016) urged hosting countries to place refugee children in mainstream education aiming to integrate refugee populations rather than prepare them for further migration. Given this recent change of the scene, this placement shifts attention to language teaching for integration. The systematic review will draw from any published literature in European context but also from any relevant research in contexts with longer experience of integrating migrant populations, such as America. This is a standalone project, aiming to report on educational practices documented in research in the field and identify research gaps to propose a future research project.

Project supervisor(s): Anna Tsakalaki

What will the outcomes of the placement be?

Student outcomes:

The student will have the opportunity to get involved in decision making, designing and conducting the specific type of research (systematic literature review). They will learn how to perform a structured sequence of consecutive steps to use available technology to run systematic literature searches. They will develop their skills in analysing and synthesising research evidence for a deeper understanding of our knowledge so far in this emerging field of research. Shared authorship or acknowledgement in the published report is an additional potential outcome for the student subject to the project reviews (see relevant field). All skills are transferable in the student's own studies and, depending on their stage, could be transferable to a postgraduate research-based degree in Education.

What tasks will the student undertake?

The student is going to be guided by the PI to follow a structured methodological procedure leading to a successful systematic literature review. The tasks will follow a standardised sequence of 5 steps: 1) definition of objectives for the review, 2) definition of methodology (which papers to include), 3) retrieval of the eligible literature (what key words to use, what search engines or databases to use) and quality-check of retrieved literature, 4) identifying findings and 5) writing a synthesis of the results (report). The duration of the tasks will be agreed with the supervisor based on the student's previous experience in literature review. The supervisor is going to provide guidance with regards to the content of each step/task and will make sure the student is offered relevant training in literature search, if needed.

What skills/knowledge/experience will the student need?

No previous knowledge is needed. Good candidates for the role are students that have conducted literature reviews in the past (for example as part of an assignment that received a good grade), but no applicants will be excluded solely on the basis that they have no prior experience. A strong interest in research in the field of inclusive education, language teaching and learning, English as an Additional Language or educating deprived populations would be ideal for the role.

EDUCATION

Title: The effect of using a reading app on beginner reading performance and use of reading strategies.

Project Summary

This placement aims to address the lack of consensus in international literature about readers' benefit from electronic texts in comparison to paper copies. Recent research has shown that comparisons between the two rarely show any significant difference in reading performance. However, this has been mainly tested in comprehension and identical versions of the text have been used in most cases (Salmeron & Delgado, 2019). In this study, interactive electronic text with built-in features will be used for four weeks with KS1 beginner readers. The features are designed to reinforce phonological knowledge, semantics and reading in context of "tricky" words following connectionist models of reading (e.g., Coltheart et al., 1993). We will measure performance in word recognition of the target words over time. At the end of the intervention, the learners will be prompted to reflect on the use of the built-in features to reinforce different types of knowledge for a word. With guidance from the PI, the student will collect data in three local primary schools and will engage in the analysis and interpretation of the findings, and in drafting a report of the results. Training in the use of the reading app and data collection tools (reading tasks) will be provided by the PI. By engaging in all the major stages of running an experimental research project in Education, the student will have a full experience of the methodological milestones of conducting experimental research.

Project supervisor(s): Anna Tsakalaki

What will the outcomes of the placement be?

Student outcomes:

The student will have the opportunity to get involved in decision making, designing and conducting the specific type of research (experimental research). They will get a first-hand experience of reviewing literature, designing and conducting experimental research and will develop their skills in administering experimental research tools (performance tests and interviews), analysing data and writing a report of the findings. Shared authorship or acknowledgement in the published report is an additional potential outcome for the student subject to the project reviews (see relevant field). The student will benefit directly from networking with other academic staff and research students at the Institute of Education working in the field of interest. All skills are transferable in the student's own studies and, depending on their stage, could be transferable to a postgraduate research-based degree in Education.

What tasks will the student undertake?

The student is going to be guided by the PI in undertaking a range of tasks corresponding to key milestones of conducting experimental research in Education. These include: 1) literature search to base generation of hypothesis, 2) data collection (reading tasks and interviews with students), 3) preparation of data for analysis (engagement in data analysis using SPSS and NVivo, if the student is interested in this task) 4) potential involvement in presenting the results in internal or external events (if the student is interested in this task) 5) interpreting and writing a synthesis of the results (draft report). The duration of the tasks will be agreed with the supervisor based on the student's previous experience and confidence in doing parts of the tasks independently. It is anticipated that the whole placement will last for 6 weeks and tasks [1], [2] and [5] are going to take a larger proportion of the placement. The PI is going to provide guidance with regards to the content of each task and will make sure the student is offered relevant training in administration of the research tools and software for data analysis, if

needed.

What skills/knowledge/experience will the student need?
No prior knowledge is essential but good knowledge of Microsoft Excel or SPSS or NVivo is desired. A strong interest in research in the field of reading development and/or the use of technologies for learning purposes would be ideal for the role.

EDUCATION

Title: Engagement and Integration: How home students and international students work together in group work assignments and the role language plays in their interactions

Project Summary

The collaborative approach to learning, and in particular the use of group tasks and assignments on modules, has become a central principle of curriculum design, justified both pedagogically and as a means to develop skills that are valued as graduate attributes. It is recognised, however, that group work assignments generate mixed feelings among students and there are all sorts of variables that can impact positively or negatively on the group dynamic and the outcomes of working together. One of these is the challenge of working together in a multilingual group and the impact (both actual and perceived) this has on communication, collaboration and outcomes. Research into collaborative learning and group work has been carried out over the last two to three decades, but there is relatively little evidence of student perceptions of the role of language and how language competence may affect interactions both in face-to-face meetings and online communication. The aim of the current research project is to gain a deeper understanding of some or all of the following: • What perceptions do students have of multilingual group work interaction (face-to-face or online)? • How is language being used in group interactions (face-to-face or online)? • What differences exist in the perceptions of international and home students • What implications does this have for management of group work assignments? The data will be collected through interviews in 2020 and much of the project work will involve both carrying out interviews and analysing and coding the interview data to identity recurring themes.

Project supervisor(s): Sarah Brewer

What will the outcomes of the placement be?

Student outcomes:

He/she will develop an understanding of how to generate and work with qualitative data • Devising interview questions • Carrying out interviews • Coding interview transcriptions • Analysing and presenting qualitative data He/she will develop the writing skills necessary to present a report on research findings She/he will be in a position to gain a greater understanding of how students work together on group work assignments and the role language plays in this in an international academic environment.

What tasks will the student undertake?
Week 1: Induction (approx. 4 hours); update ethical approval for interviewing purposes; familiarise with interview procedure and writing effective interview questions; read introductory literature and write brief summary Week 2 : Carry out 30-minute interviews with both home and international students Weeks 3 and 4: Transcription of interviews (some may be transcribed externally); analyse data by thematic coding Weeks 5 and 6: Identify key findings of significance for (a) subject departments, (b) ISLI, and (c) the University as a whole, and present as a report

What skills/knowledge/experience will the student need?

1. Good written skills 2. Good IT skills 3. Ability to apply a critical and analytical approach 4. Ability to work independently

COMPUTER SCIENCE

Title: Information Visualisation of Massively Complex Data

Project Summary

Data visualisation is the most effective way of communicating information in various discipline and fields such as in research, science and technology, commerce, and media. Data visualisation plays a vital role in storytelling in today's digital society. This project takes a highly interdisciplinary view and addresses topics in multiple disciplines: science, engineering, business, media, arts. This project focusses on the understanding the data visualisation concepts, principles, techniques, and tools for effective visualisation and analysis of real word massively complex data sets such as from https://www.kaggle.com/datasets and https://data.gov.uk/. In this project, the student will explore techniques for processing and visualising the identified datasets. Moreover, students will gain the ability to extract, transform, load data for information visualisation and attain skills to understand the effectiveness of visualising data analytics outputs for human's perception and cognition.

Project supervisor(s): Varun Ojha

What will the outcomes of the placement be?

Student outcomes:

The student will develop the ability to: (i) Summarise and interpret real worlds open-source datasets. (ii) Apply tools and perform data analytics using python and d3js. (iii) Analyse, evaluate compare results and create and compare information visualisation.

What tasks will the student undertake?

The project will be in three phases: (i) The first two weeks, students will explore real-world datasets; data visualisation techniques; review application (information dissemination fields such as media, science, and technology; and select a domain and process related to datasets. (ii) The second two, weeks, students will study python and data visualisation tools; perform data analytics; produces statistics and results; and work on strategies to visualise the results. (iii) The final two weeks, the student will work and experiment of various ways to visualise information for optimum information accuracy; perform a comparative study of the produced visuals and write a report in the final week.

What skills/knowledge/experience will the student need?

The students will need basic knowledge of any programming language acquired at level 5 (Second year of UG degree), preferably in python or java.

COMPUTER SCIENCE

Title: Exploring parallel programming languages for climate and weather

Project Summary

For computational science, efficient coding by domain scientists and performant execution of a simulation is key to conduct world-class science. Traditionally, languages such as Fortran and C++ are used to develop scientific applications. In those languages, parallelism was added as an afterthought that complicates development. Modern languages such as Julia, Rust, and Go embed concepts for parallel computing in their language and promise higher productivity. As part of this placement, we will explore different modern languages and assess their potential for applications in climate/weather on a simple use case.

Project supervisor(s): Julian Kunkel

What will the outcomes of the placement be?

Student outcomes:

Basic understanding of parallel computing. Performance analysis of programming languages and system architectures. Basic skills in modern programming languages. Understanding of the scientific computing

What tasks will the student undertake?

Researching the programming languages. Developing prototypes for the mini-application. Measuring performance for various configurations. Discussing performance results and system architectures Creating a report Preparing a final presentation

What skills/knowledge/experience will the student need?

Good programming skills Beneficial (but not needed) would be a core understanding of parallel/scientific workflows.

METEOROLOGY

Title: Relationship between the Northern-hemispheric temperature gradient and Sahel rainfall: historical changes and future evolution

Project Summary

The economy of Sahelian countries strongly relies on the strength of the West African Monsoon. However, there are large uncertainties in how the West African Monsoon will change in the future, especially over the semi-arid Sahel. This uncertainty is due to the large range of atmospheric circulation changes predicted over West Africa due to increases in greenhouse gases in state-of-the-art climate models. Our ongoing work shows that uncertainties in Sahel precipitation change are primarily associated with uncertainties in the gradient, or difference, in sea surface temperature changes over the northern Hemispheric from high-latitudes (north of 60°N) and tropics (20°S-20°N). However, the historical and future evolutions of the northern hemispheric temperature gradient are unknown, as well as how it influences Sahel rainfall. Changes in the northern hemispheric temperature gradient are also expected to be associated with natural variations in the climate but also due to human activity. The aim of this project is to bridge this gap in our understanding of how sea surface temperature changes affect Sahel rainfall. The student will use the output of a sophisticated climate model to identify how the northern hemispheric temperature gradient changes, and how those changes affect Sahel rainfall over the 21st century. Results of the project will be used to feed into our current research and could be turned into a scientific paper, or to write a research proposal.

Project supervisor(s): Dr. Paul-Arthur Monerie and Dr. Jon Robson

What will the outcomes of the placement be?

Student outcomes:

Throughout this project, the student will have the opportunity to gain knowledge in climate dynamics and tropical meteorology, as well as to have an overview on the impact of climate change on Sahel precipitation. The project will also allow the student to develop their data analysis and scientific programming skills, with support from the supervisors. As an optional output the student will have the opportunity to work on communication skills, preparing a presentation for a scientific audience.

What tasks will the student undertake?

Task 1: The student will spend the first week reading the relevant publications on the impacts of climate change/sea surface temperature change on Sahel precipitation and to familiarise with the database and the programming language. Task 2: the second task will take one week and a half and consist in computing the sea surface temperature gradient in a pre-industrial control simulation and to analyse the impact of the gradient on surface-air temperature and precipitation, and to identify the relevant modes of variability that explaining the variability of the temperature gradient. Task 3: the work of the 2nd task will be expanded to other variables, such as low-level wind and vertical velocity to document impacts on the West African Monsoon dynamic, this will take one week. Task 4: the analysis of the future changes in precipitation and temperature will be done by analysing model outputs of the 20th and 21st century, and would take approximately one week. Task 5: a short and simplified process-bases analysis will be performed, by computing lead-lag regressions between the change of the temperature gradient and other variables, like the Arctic sea ice extent and the strength of the Hadley cell circulation. This fifth task will take an additional week and will allow the student to understand the drivers of the future changes of the temperature gradient. However, should the student have spare time within the six-week period, there is plenty of scope for further investigation.

What skills/knowledge/experience will the student need?

As the bulk of this project involves analysing data, experience with a programming language would be an advantage (e.g. Matlab, NCL, Python), but analysis code will be provided. The student should have an interest in meteorology/climatology, particularly of the tropics.

METEOROLOGY

Title: Human drivers of observed changes in the West African Monsoon.

Project Summary

The drought of the 1970s and 1980s had strong impacts over Sahel, leading to significant migration, famine, and economic loses. The origin of the drought is not well understood and has been associated with both natural and human induced changes. However, climate models have large deficiencies in their representation of the West African Monsoon variability, and most models are unable to reproduce the observed changes in Sahel precipitation. Therefore, a better understanding of the causes of the historical evolution of the West African Monsoon would be useful to improve predictions of Sahel rainfall and to provide a more accurate information to decision makers. Our ongoing work has highlighted that the CESM1 climate model produces a shift from a relatively wet to a relatively dry Sahel during the early 20th century. However, this trend has not yet been understood. This project will focus on the analysis of the CESM1 climate model outputs, and particularly on a sensitivity experiment in which the time-evolution in greenhouse gases concentration have been kept constant over the 20th century, and a simulation in which the time-evolution in the anthropogenic aerosol emissions have been kept constant over the 20th century. These simulations will allow us to identify the drivers of the Sahel precipitation drying trend within this particular model.

Project supervisor(s): Dr. Paul-Arthur Monerie and Dr. Jon Robson

What will the outcomes of the placement be?

Student outcomes:

Throughout this project, the student will have the opportunity to gain knowledge in climate dynamics, tropical meteorology and understanding impacts of internal climate variability and external forcing on climate, with a focus on Sahel precipitation. The project will also allow the student to develop or enhance their data analysis and scientific programming skills, with support from the supervisors. As an optional output the student will have the opportunity to work on communication skills, preparing a presentation for a scientific audience.

What tasks will the student undertake?

Task 1: The student will use the first week to read the relevant publications on Sahel precipitation variability and on the historical Sahelian drought. The first week will also allow the student to familiarise with the database and the programming language. Task 2: The student will compute analyse how precipitation has changed during the 20th century, over West Africa, and in average over the Sahel, in both observation and CESM1. The student will quantify model's biases in precipitation. This task is expected to take one week and a half. Task 3: The student will also analyse how precipitation is changing, during the 20th century, using several sensitivity experiments that have been performed with CESM1, to identify drivers in Sahel precipitation; this would take another week. Task 4: The analysis will be focused on changes in large-scale surface air temperature, low-level wind, vertical wind and moisture flux, to provide a detailed explanation of how human activity and natural variability impacts the West African Monsoon. This task will take one week and a half. Task 5: the student will make use of the large number of simulations (i.e. 20) of CESM1 to compare the impacts of anthropogenic aerosols (or greenhouse gases) to changes that are associated with the stochastic internal climate variability, to assess robustness in the impacts of the external forcing. In the task 5 the student will only focus on area-averaged Sahel precipitation, and will take another week. However, should the student have spare time within the six-week period, there is plenty of scope for further investigation.

What skills/knowledge/experience will the student need?
As the bulk of this project involves analysing data, experience with a programming language would be an advantage (e.g. Matlab, NCL, Python), but analysis code will be provided. The student should have an interest in meteorology/climatology, particularly of the tropics.

METEOROLOGY

Title: Exploring the use of high-resolution climate models to simulate European energy variables and their future projections

Project Summary

With higher penetration of renewable energies and the effort to decarbonize power production over Europe there is a strong interest in the objective characterization of energy variables and the impacts of climate variability and change. At the typical resolution of IPCC-style climate simulations (~100km), the models are unable to represent some of the smallscale processes that are likely to impact energy variables (e.g., topographic effects, local circulations, etc). Precise regional studies of energy variables often rely on the implementation of intermediate downscaling methodologies to climate variables before the conversion to energy. This project aims to assess whether the use of high-resolution climate simulations such as the ones developed for the PRIMAVERA EU Horizon2020 project can by-pass these downscaling stages and, through apropriate bias-correction methodologies, capture the main features of European wind power and energy demand. Additionally, the PRIMAVERA simulations allow to evaluate the added value of the higher resolution of the climate model. The student will use model data to force energy models: wind power, energy demand and potentially solar power) and will implement different bias-correction methodologies to optimize the skill of the modelled energy variables. The impact of the increased resolution of the PRIMAVERA simulations will also be assessed.

Project supervisor(s): Paula Gonzalez

What will the outcomes of the placement be?

Student outcomes:

- The student will gain experience working in an interdisciplinary area - They will have the opportunity to attend and potentially present at Energy- Meteorology group meetings (weekly) - The project will provide enhanced experience in programming and managing large datasets - The student will gain experience working on a linux environment - If the results allow it, the student might have the opportunity to contribute towards a publication or conference presentation

What tasks will the student undertake?

The student will be provided with sample code to read model output data and to run the energy conversion models . They will have to combine them into a conversion system that implements the different biascorrection methodologies to be tested. This stage will take around 2 weeks. Post-processing code will also have to be developed to evaluate the performance of the methodologies when compared to reanalysis (i.e., to assess the systems' ability to represent certain features of the 'observed' energy variables). A staged approach will be implemented to allow for the application to as many models and resolutions as possible given the time constraints. The results will be summarized through a set of figures and/or diagrams (e.g., flow charts for the different methods, maps displaying skill metrics, etc). This stage will take 3 to 4 weeks. The student will finally develop a written description of the methodologies and the results. This stage will take around 1 week.

What skills/knowledge/experience will the student need?

- Experience with a programming language such as python, MATLAB or R - some knowledge of statistics will be beneficial

PSYCHOLOGY

Title: Seeing a visual world

Project Summary

As we move around the world scanning our environment our gaze shifts rapidly, 3 to 4 times per second, settling on objects of interest often as result of our goals. These rapid, saccadic eye movements are necessary due to inhomogeneities across the visual system and result in large changes in the motion and relative position of the entire visual environment. Nevertheless, our experience of the visual world is one of stability: things don't appear to move and they don't change their features. How we glue one view of the world on to the next in the face of such dramatic and dynamic changes is poorly understood especially when considered as part of our usual active chain of eye movements. This project will consist of a series of experiments that examine how information from one viewpoint is integrated with another and the impact of this when faced with making multiple saccadic eye movements.

Project supervisor(s): Eugene McSorley

What will the outcomes of the placement be?

Student outcomes:

Project management skills, research methods, data analysis, technical skills in running an eye tracking lab.

What tasks will the student undertake?

The student will be involved a larger research project and as such will take part in project development, participant recruitment, data collection, data analysis, data summary.

What skills/knowledge/experience will the student need?

Prior knowledge of research methods and data analysis needed. Further training provided.

PSYCHOLOGY

Title: Anhedonia and Adolescent Depression

Project Summary

Anhedonia and Adolescent Depression Adolescence is a period of change that crucially increases vulnerability to depression. Studies report blunted neural responses to reward that relate to positive affect and depression symptoms in adolescents. However how these results relate to the symptom of anhedonia in adolescents is not entirely clear. We have been examining how the brain responds to reward and aversion in those at risk of depression and adolescents with depression and anhedonia symptoms. In this placement we will use an fMRI task measuring the different components of reward and aversion processing such as the anticipation and consummation of reward. More recently we have also begun to measure effort for reward as a proxy for motivational deficits in depression. This work will examine if there are blunted brain responses to reward and aversion in adolescents with symptoms of depression. We will also examine if there is reduced physical effort for reward in those with symptoms compared to controls. Finally we also show how the dimensional experience of anhedonia correlates with neural responses and effort for reward and aversion in adolescents. We will address the shortcomings of the current literature on anhedonia in adolescent depression and show how the links between the experience of anhedonia in adolescent depression and the behavioural and neural measures of reward could be improved. The overall goal of this work is to provide novel treatment targets based on reward for adolescent depression.

Project supervisor(s): Ciara Mccabe

What will the outcomes of the placement be?

Student outcomes:

We will teach the student about depression research in adolescents and the future directions needed to develop new treatments.

What tasks will the student undertake?

We have developed over a number of years a task to examine reward anticipation, consummation and effort.

What skills/knowledge/experience will the student need?

Basic knowledge of depression symptoms and SSPS.

PSYCHOLOGY

Title: Exploring experiences of students with a specific learning difficulty at the University of Reading

Project Summary

The primary aim of this project is to explore the experiences of University of Reading students who have a specific learning difficulty (SpLD). SpLD is an umbrella term that includes dyslexia, dyscalculia, dyspraxia, and Attention Deficit (Hyperactivity) Disorder (AD(H)D). HEFCE (2015) found that approximately 6% of Higher Education students have an SpLD and so, we need to make sure that the support in place for our students is the most effective. This is particularly important as the current RUSU part-time officer, Charlotte Hyde has written in Reading Rep (December 2019) about the importance of providing students with the opportunity to feel listened to and to discuss what appropriate support should be in place for them to succeed. In order to meet the points raised by HEFCE and RUSU, the project will involve recruitment of students with an SpLD to find out a) the current level of support they are receiving, b) what is working well, and c) what could be done to improve their University experience further. The PI will support the student in researching relevant sources that highlight why the experiences of students with an SpLD should be considered. This will include a focussed discussion on the Equality Act (2010) as well as relevant research papers in academic journals. The placement will include engaging with other students and completing research on a real-life issue.

Project supervisor(s): Dr Allán Laville

What will the outcomes of the placement be?

Student outcomes:

The student will develop skills in a) advertisements for participant recruitment, b) good quality data collection and data entry, c) the student will receive training in how to conduct thematic analysis, and d) develop report writing skills.

What tasks will the student undertake?

This placement will involve the student engaging in: 1. Recruitment of participants, namely students with an SpLD who are completing their studies at the University of Reading. This will be done by email as well as printed advertisements in Schools. 2. Data collection: This will involve conducting 20-minute semi-structured interviews with participants. 3. Analysis: This is a qualitative project which will use thematic analysis. 4. Project report write-up.

What skills/knowledge/experience will the student need?

The student should have some knowledge of the SpLD research literature. The student should have good communication skills and some experience of data collection.

PSYCHOLOGY

Title: Can a high flavonoid diet improve mothers' mental health in the immediate postnatal period?

Project Summary

Postnatal depression (PND) is a type of depression that occurs after having a baby. PND has been estimated to affect 1 in 10 new parents (NHS, 2019) and mothers in particular are at an increased risk of developing PND in the first year after childbirth. Research has shown that mothers with PND have more cognitive, behavioural and interpersonal issues, and lower mood, energy and concentration than mothers without PND (Stewart et al, 2003). Current treatments include self-help, support from local and national organisations, psychological therapy or antidepressants with varying success rates. Further research is required to investigate accessible, cost-effective preventions or treatments for at risk mothers. There is also a pressing need to investigate natural alternatives to medication, especially for breastfeeding mothers who do not want to expose their infants to pharmaceuticals through breast milk. Flavonoids are naturally occurring compounds found in foods such as berry and citrus fruits, leafy green vegetables, tea, chocolate and red wine. Evidence suggests that consumption of high flavonoid foods can improve health and cognitive outcomes (Lamport et al, 2012; Bell et al, 2015). Research has also indicated that flavonoids may have the potential to positively impact mood (Pase et al, 2013; Khalid et al, 2017). The research aim will be to investigate whether implementation of a high flavonoid diet across a 2 week period positively affects maternal mental health, specifically mood and perceived quality of life. The placement is stand-alone research and will act as pilot data for future research activities.

Project supervisor(s): Dr Katie Barfoot

What will the outcomes of the placement be?

Student outcomes:

Students will gain experience of running an online study from beginning to end. Students will learn how to engage with potential participants and recruit them into an intervention trial, having creative freedom in making and distributing advertising materials. Students will also gain experience on the online cognitive task software 'Collector' and 'Gorilla'. Training on scoring outcome measures, such as mental health questionnaires, will be provided allowing students to broaden clinical data coding skills. Students will also learn how to organise data coming in from participants in a format that is suitable for data analysis, and if time permits, some data analysis can be started during the placement. Students will have contact with participants via email and telephone, expanding their skills in professionalism, interpersonal relations and increasing their confidence in recruiting from the general public.

What tasks will the student undertake?

The placement will involve recruiting mothers of infants under 1 year old to take part in an online study investigating diet and mental health. Mothers will be assigned to either a high flavonoid diet or a no change to diet condition for 2 weeks. They will complete online questionnaires (PANAS-NOW, Bond-Lader scales, WHOQOL, MFQ, measure of Depression/Anxiety) at the start (day 0) and end (day 14) of the dietary intervention. Applicants will manage the study from recruitment through to the data collection and processing stages. Recruitment can be carried out by any means suitable – through local community groups, notice boards, flyers, online social networks, online forums (such as netmums) and word of mouth. Prospective applicants will lead this recruitment drive and will be responsible for creating adverts, posting on sites and reaching out to the target population. This will be their main activity throughout week 1 of the placement, however recruitment will be ongoing and will continue

through to week 4. The aim will be to recruit 80 participants (minimum; 40 per condition; $F(4,312)=2.40$). The online study will be set-up prior to the start of the project. The applicant will not need to physically test participants; the study will be completed online via a link. The applicant will need to recruit participants and send them the link to the online questionnaires. The applicant will be expected to follow up participants who have not completed all test sessions within a 2 week period by email or telephone to encourage them to complete test sessions and prevent incomplete data sets. Once testing is underway, the applicant will need to access completed online questionnaires and extract the data ready for scoring. Applicants will be required to score PANAS-NOW, Bond-Lader scales, WHOQOL, MFQ, and the measure of Depression/Anxiety and input these scores into Excel. This will develop applicant's technical skills through using cognitive testing software and will enable applicants to learn how psychologists transcribe mental health questionnaires. Applicants will be provided with adequate training to perform these tasks. Data will be organised into an Excel document in a format that will enable the data to be analysed using statistical software. An overview of project tasks and the proportion of time to be spent on them is listed below: Week 1: Recruitment (including creation of advertising materials) – 80% Familiarisation with study procedure & materials – 10% Setting up data collection processes – 10% Week 2: Recruitment – 80% Familiarisation of scoring materials – 10% Setting up data processes – 10% Week 3: Recruitment – 75% Scoring & data processing – 15% Participant follow-ups – 10% Week 4: Recruitment – 30% Scoring & data processing – 30% Participant follow-ups – 40% Week 5: Scoring & data processing – 40% Participant follow-ups – 60% Week 6: Scoring & data processing – 60% Participant follow-ups – 40%.

What skills/knowledge/experience will the student need?
Skills and knowledge required by student: Essential: - Experience of working with Excel - Students should be able to sufficiently organise advertising materials and potential recruitment pathways in a timely manner - Students must be able to act friendly but professional in email and telephone follow-ups Desirable: - Awareness of posting on forums and social media to advertise study (adhering to individual page guidelines) - Students must be willing to learn how to score cognitive tasks and mental health questionnaires - Students should be able to organise data in a logical way within an Excel document ready for data analysis - Understanding of ethical principles of scientific research including participant anonymity.

PSYCHOLOGY

Title: Investigating the Representation of 3D Scenes in Moving Observers

Project Summary

Our lab focuses on theories about how the brain represents 3D scenes as the observer moves around. Currently, there are very different types of models: one type assumes that the brain generates a 3D model of the scene (either centred on the observer or fixed relative to the word, "allocentric"). Another type of model assumes that the brain "knows" about the way that images change as the observer moves and can do this without building a 3D model. Modern neural network approaches are of the second type. The UROP projects would be part of a larger effort to distinguish between these two types of models. Participants will be asked to explore a realistic indoors scene in VR. Specifically, after viewing the scene from one location ('home') they will be transported virtually to a different location from where they must return 'home'. The pattern of errors that observers make will allow us to discriminate between candidate representations. The student will be actively involved in data collection, analysis and interpretation of the results.

Project supervisor(s): Prof Andrew Glennerster

What will the outcomes of the placement be?

Student outcomes:

The student will have the opportunity to gain experience with Virtual Reality and develop transferable skills on data analysis and programming (MATLAB, C#). Furthermore, the student will receive training on software such as Unity Game Engine and develop their knowledge on psychophysical experiments. The level of skills developed will be decided in agreement with the student. Finally, if the project leads to data that are included in a publication, the student would be included in the development of the manuscript.

What tasks will the student undertake?
The student will be involved in data collection as well as data analysis. The student will be expected to also advance his/her knowledge in the field through reviewing relevant literature.

What skills/knowledge/experience will the student need?
The student is expected to show enthusiasm for the project and keenness to learn. The student should, preferably, have a good understanding of statistics while experience with MATLAB is desirable but not necessary.

PSYCHOLOGY

Title: Neural basis of emotion processing in running speech, vocal music and instrumental music in Autism Spectrum Disorder (ASD)

Project Summary

Sensitivity to subtle pitch changes plays a fundamental role in the decoding of emotional meaning in music and speech prosody. Hypersensitivity to pitch variations in autism seems to benefit the processing of musical emotions (i.e. intact ability to process emotions in music) and plays a seemingly compensatory role in processing prosodic emotions (i.e. intact ability to process emotions when prosody is presented alone without verbal content). Implementing a multi-distractor paradigm with emotional speech and music presented simultaneously, this project will investigate how well individuals with autism and typically developing individuals can track and make use of pitch information to infer emotions in the presence of an auditory distractor in music and speech. This will be examined through the use of behavioural and EEG measures. The underlying role of pitch and cognitive processing will also be examined in relation to participants' performance. The findings will provide insights into the cognitive and neural processes associated with emotion processing in music and speech, as well as advancing our understanding of emotional functioning in autism.

Project supervisor(s): Dr Fang Liu

What will the outcomes of the placement be?

Student outcomes:

The student will have the opportunity to gain experience with Virtual Reality and develop transferable skills on data analysis and programming (MATLAB, C#). Furthermore, the student will receive training on software such as Unity Game Engine and develop their knowledge on psychophysical experiments. The level of skills developed will be decided in agreement with the student. Finally, if the project leads to data that are included in a publication, the student would be included in the development of the manuscript.

What tasks will the student undertake?

The student will gain hands on experience in the research process, including reviewing the literature, recruiting and testing participants, familiarise with EEG setups, analysing the data, and presenting and writing up the results. The supervisor will work closely with the student at all stages to help them develop new skills and expertise in each area. If the study results in publishable findings, the student would be involved in the write-up of the results and included as an author on any publications. General transferable skills to be developed include team-working, computing and analytical skills, report writing and presentations skills.

What skills/knowledge/experience will the student need?

The student is expected to have a background in psychology with a keen interest and enthusiasm for the study of music, language and autism. The student should also have excellent organisational, interpersonal and communicative skills that are necessary to interact with participants and research group members.

PSYCHOLOGY

Title: Effects of decision pre-commitment on learning from experience

Project Summary

Previous UROP projects in our lab have demonstrated that the way we learn from experience is influenced by the context of our decisions. For example, we have shown that uncertainty and reward value affect how quickly we learn associations. These observations relate to how we understand the external environment. However, we know less about how our own internal beliefs about the world affect how we interpret our experiences. This project aims to understand how committing to a particular interpretation of the environment affects how we update what we know about it. To do this, we are developing a "choice commitment" task which will allow us to measure and describe how belief formation affects subsequent learning. Broadly, this task involves a period of exposure to non-informative associations, which nevertheless lead to a requirement to commit to a relevant preference. The task is then structured such that it presents information either congruent or incongruent relative to the choice commitment. The key metric of interest is the rate of learning in each of these conditions. The UROP student will contribute to the development of the task and will collect a dataset that will feed into our broader ongoing work on the neurobiology of decision-making. The student will lead the task development and testing, and work closely with a PhD student and other members of the lab. Their work will cover all aspects of the project, from conceptualisation, experimental design, behavioural testing, data analysis, and results presentation.

Project supervisor(s): Dr Anastasia Christakou

What will the outcomes of the placement be?

Student outcomes:

The placement will help the student to develop their understanding of the research environment and application of the scientific method. This will help students to prepare for their empirical third year project, and will allow them to develop thinking and skills that will be useful post-graduation in a research or professional environment. During the placement the student will have the opportunity to acquire research skills not typically available during a typical undergraduate degree, e.g. the opportunity to code software and data analysis

What tasks will the student undertake?

The student will be involved in: the review of relevant literature; generation of specific hypothesis; design of the experiment; recruitment of participants; running the experiment; analysing data; presentation of results. There will also have the opportunity to observe some of the neuroimaging work in the lab, and attend weekly seminars in the neuroimaging facility. The student will also be involved in drafting a manuscript for peer-reviewed publication depending on their level of engagement with the project. As part of the student's induction on day 1, the supervisors and student will agree a structured plan for the placement, with specific targets set for each week.

What skills/knowledge/experience will the student need?

The student is expected to have the basic knowledge and understanding resulting from the two years of undergraduate study in psychology, life sciences, mathematics, economics or related discipline. A confident grasp of experimental design and methods; ethical issues in research; numeracy and statistics; experience of Microsoft Excel and SPSS software; experience with coding (e.g. in R, Matlab, or Python) is desirable but not necessary. The student should also show an interest in the background and

the goals of the project, have the appropriate time-management and communication skills necessary to interact with adult research volunteers and research group members.

GEOGRAPHY AND ARCHAEOLOGY

Title: Impact of organic fertilisers on volatile organic compound (VOC) emissions in tropical soils

Project Summary

Widespread use of inorganic fertilisers has left tropical soils across Sub-Saharan Africa infertile and acidic. Combusting crop residues to produce biochar (a carbon rich material, similar to charcoal) and applying to acidic tropical soils can remarkably increase crop yields due to a liming effect (an increase in soil pH). As a result, there are initiatives being implemented globally to encourage subsistence farmers in the tropics to exploit biochar as novel biotechnology by applying it to acidic infertile soils. However, there are potentially negative impacts of biochar application that could result in unintended consequences. Biochar could release volatile organic compounds (VOCs) into the soil environment and cause toxicity to plants or soil organisms. The main aim of this project is investigate the relationship between biochar properties (feedstock selection and pyrolysis temperature) and the release of VOCs in tropical soils. You will analyse the VOCs present in mixture of soil and biochars using GC-MS. Results will inform recommendations on the most appropriate biochar production parameters to reduce any negative impacts of biochar application.

Project supervisor(s): Alfonso Rodriguez Vila

What will the outcomes of the placement be?

Student outcomes:

This project will be a high impact authentic learning opportunity that will enable you to develop research skills by progressing through all stages of the research process as part of a real project. You will develop, as result of the placement, laboratory analytical skills, new software knowledge (Xcalibur software for GC-MS), teamwork and time management skills, project management skills, data handling skills and problem-solving skills. The results of this experiment may be included in a peer review publication. This along with the skills developed during the placement will be an important improvement of the student's background that will help the student to apply for grants. The results of this project will Increase the knowledge of the School (SAGES) and the Department (Department of Geography and Environmental Science) by obtaining new findings on the impact of organic fertilisers on VOCs emissions in tropical soils. There are initiatives being implemented globally to encourage subsistence farmers in the tropics to apply biochar to acidic infertile soils. It is thus important that all the implications of biochar application to tropical soils are understood prior to widespread indiscriminate adoption of this revolutionary agricultural biotechnology. Results of this placement will inform recommendations to reduce any negative impacts of biochar application by subsistence farmers in tropical countries. The project will be a chance for the PI (postdoc) to gain experience in supervise students. As postdoc the PI has supervised students before informally, but has not been the primary supervisor of students before. The PI will gain supervisory experience with this placement. The supervisors will benefit from a new enthusiastic student with fresh ideas who support research.

What tasks will the student undertake?

The student will be involved in: the review of relevant literature; generation of specific hypothesis; design of the experiment; recruitment of participants; running the experiment; analysing data; presentation of results. There will also have the opportunity to observe some of the neuroimaging work in the lab, and attend weekly seminars in the neuroimaging facility. The student will also be involved in drafting a manuscript for peer-reviewed publication depending on their level of engagement with the project. As part of the student's induction on day 1, the supervisors and student will agree a structured plan for the placement, with specific targets set for each week.

What skills/knowledge/experience will the student need?

The tasks that the student will undertake are: Experimental design, preparing soil and biochar samples for analyses, analysing soil and biochar samples for VOCs using GC-MS, and analysis of other soil and biochar properties to help explain the relationships (75%). Recording and plotting data from analyses, report writing and presenting (25%).

GEOGRAPHY AND ARCHAEOLOGY

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Project supervisor(s): Alfonso Rodriguez Vila

What will the outcomes of the placement be?

Student outcomes:

This project will be a high impact authentic learning opportunity that will enable you to develop research skills by progressing through all stages of the research process as part of a real project. You will develop, as result of the placement, laboratory analytical skills, new software knowledge (Xcalibur software for GC-MS), teamwork and time management skills, project management skills, data handling skills and problem-solving skills. The results of this experiment may be included in a peer review publication. This along with the skills developed during the placement will be an important improvement of the student's background that will help the student to apply for grants. The results of this project will Increase the knowledge of the School (SAGES) and the Department (Department of Geography and Environmental Science) by obtaining new findings on the impact of organic fertilisers on VOCs emissions in tropical soils. There are initiatives being implemented globally to encourage subsistence farmers in the tropics to apply biochar to acidic infertile soils. It is thus important that all the implications of biochar application to tropical soils are understood prior to widespread indiscriminate adoption of this revolutionary agricultural biotechnology. Results of this placement will inform recommendations to reduce any negative impacts of biochar application by subsistence farmers in tropical countries. The project will be a chance for the PI (postdoc) to gain experience in supervise students. As postdoc the PI has supervised students before informally, but has not been the primary supervisor of students before. The PI will gain supervisory experience with this placement. The supervisors will benefit from a new enthusiastic student with fresh ideas who support research.

What tasks will the student undertake?

The student will be involved in: the review of relevant literature; generation of specific hypothesis; design of the experiment; recruitment of participants; running the experiment; analysing data; presentation of results. There will also have the opportunity to observe some of the neuroimaging work in the lab, and attend weekly seminars in the neuroimaging facility. The student will also be involved in drafting a manuscript for peer-reviewed publication depending on their level of engagement with the project. As part of the student's induction on day 1, the supervisors and student will agree a structured plan for the placement, with specific targets set for each week.

What skills/knowledge/experience will the student need?
The tasks that the student will undertake are: Experimental design, preparing soil and biochar samples for analyses, analysing soil and biochar samples for VOCs using GC-MS, and analysis of other soil and biochar properties to help explain the relationships (75%). Recording and plotting data from analyses, report writing and presenting (25%).

GEOGRAPHY AND ARCHAEOLOGY

Title: Improving the resilience of soils to extreme weather

Project Summary

More frequent extreme weather exerts multiple threats to soil ecosystem services and thus deteriorates plant performance. Improving the resilience of soils to perturbations caused by extreme weather, such as droughts and floods, is critically important to ensure soil health and maintain agricultural productivity. The soil microbial community is the driver of soil ecosystem services and has a close relationship with plants. When plants are alive, their root exudates can select the microbial community which favours certain chemical compounds. When plants die, microorganisms breakdown plant residues and recycle nutrients in soil ecosystem. We hypothesize that the links between plants and the soil microbial community are positively enhanced by the plant diversity. And that enhanced links may make the soil ecosystem more resilient to external perturbations, such as droughts and floods. This study will investigate how single plant species and diverse mixtures of plant assemblages affect the response of soil key functions (i.e. respiration) and the microbial community composition to drought and flooding perturbations. The output of this study will lay the foundation to enhance soil sustainability and increase agricultural productivity.

Project supervisor(s): Dr Xin Shu

What will the outcomes of the placement be?

Student outcomes:

The skills of conducting precise laboratory and field research, data analysis, and report writing.

What tasks will the student undertake?

1) Undertake soil sampling on a field experiment at Sonning farm where monocultures are grown alongside polycultures 2) Characterise key chemical properties of the soils, such as pH, organic matter, and available nitrogen. 3) Allocate the soils to treatment that will undergo drought or flooding perturbations 4) Measure soil key function (i.e. respiration) and microbial community composition. 5) Process collected data and write a summary report.

What skills/knowledge/experience will the student need?

Experience of working in a laboratory.

GEOGRAPHY AND ARCHAEOLOGY

Title: Digital Archaeology for Medieval Funerary Heritage

Project Summary

The UROP student will work as part of the international Marie Sklodowska Curie project (Social Landscapes as Multicultural Spaces: Stecci in Bosnia and Herzegovina), which is investigating the cultural roles of stecci, medieval tombstones in Bosnia and Herzegovina (BiH) and the wider SE edge of Europe. Stecci, spanning the 12th to 16th C, synthesise the historical, chronological, cultural and religious components of the medieval Western Balkans. There are over 60,000 tombstones scattered around BiH. The project integrates complementary datasets from the archaeological and historical record. It adopts an innovative and interdisciplinary approach to study medieval funerary archaeology, to understand the social life of medieval Bosnian society that left us stecci. To model 'inter/intra-group' interactions in medieval Bosnia, the project is integrating principles from landscape archaeology, remote sensing, digital humanities, and the scientific and theoretical approaches of social archaeology with medieval iconography and epigraphy, therefore bringing an entirely new understanding of European medieval archaeology. This placement will contribute to the modern scientific documentation and presentation of the research into stecci tombstones. In addition to their imperative role as the depiction of the in-situ situation, the documentation produced before, within and after archaeological investigation should be carefully planned in advance. The outcome of the UROP placement will become the standard for the future recording of the archaeological research in the region.

Project supervisor(s): Saša Čaval

What will the outcomes of the placement be?

Student outcomes:

The student will develop skills in: - Personal effectiveness (organisational skills, time management, preparation and prioritisation, responsiveness to changes), - Research governance and organisation (Intellectual property rights and copyright, appropriate practice, research strategy, project planning and delivery, risk management), - Communication and dissemination (international team-work communication methods, media and publication types), - Gaining knowledge and intellectual abilities to do research (research use of digital tools such are photo imagery, image processing, etc.). - The complete knowledge of the type of digital documentation and its workflow. Specialist software skills that the student will acquire are currently sought after, at least by Archaeology employers, Thus, apart from research skills, this would also boost the student's future employability.

What tasks will the student undertake?

The student will undertake the following tasks: • Preparing and updating a list of documentation forms for the archaeological study of various archaeological features (in Excel, FileMaker (training provided)); • Operating with the raw documentation (scanned forms, images, 3D models, plans, etc.) uploaded to OneCloud; • Processing (editing and standardising) photo images of archaeological features. • Generating a timetable for the digital archaeological recording of the surveys and pre-, during and post-excavation processing; • Producing screencasts and a blog, detailing the process, which will be hosted on the project's webpage and used as a future teaching/research tool for digital archaeology.

What skills/knowledge/experience will the student need?

The placement offers a high impact learning opportunity for students considering the development of

research skills and awareness, providing an authentic experience of a range of steps in the research process when using digital tools. The student is not required to have any skills as they will receive the training. However, an interest in heritage, and/or digital processing and archaeological processes and tools would be beneficial.

GEOGRAPHY AND ARCHAEOLOGY

Title: Geography's History

Project Summary

University of Reading's Department of Geography is undertaking a wholesale change in its approach to online media, content generation and marketing to prospective students. Part of this approach is to uncover stories from the Department's history that help us to create an effective narrative of our past achievements. These include research innovation and excellence and leadership in movements such as feminist geographies. We want to write the history of where the department has come from since its foundation. We are seeking an enthusiastic researcher to help uncover these stories and to write a deep history of the department in a variety of formats. This information and content will be used for student recruitment, can be put on our website, and can help current staff and students to engage in carrying on our shared story.

Project supervisor(s): Dr Dave McLaughlin

What will the outcomes of the placement be?

Student outcomes:

This project provides valuable experience in project management and allows for the development of qualitative research skills, experience in data analysis, report and writing, and verbal presentation. Verbal communication skills will be developed through the interaction with interviewees and through presentation at end of project. Writing skills will be enhanced through the report and the production of social media and online content. In addition, the project will provide an ideal opportunity for a student to develop skills in media communication, design and video production.

What tasks will the student undertake?

The student's tasks may involve: project planning, identification of source material and interviewees, desk-based research, archival research, interviews (face-to-face, via Skype and telephone), report writing, social media content production, video production, presentation of findings to Department management.

What skills/knowledge/experience will the student need?

This is an interdisciplinary project and we welcome applications from enthusiastic and creative students from a diverse range of social science, arts and humanities backgrounds. Good verbal and written communication skills are essential, along with some knowledge of qualitative research techniques, data analysis and sound IT skills. We will provide further training and support in these areas. Experience of using visual methods or social media content creation would be an advantage.

CONSTRUCTION MANAGEMENT

Title: Modification of the local microclimate by clusters of trees

Project Summary

Urban trees are one of the key factors that determine energy, mass, and momentum exchanges in urban environments. The cooling effect of vegetation and its positive effect on urban microclimate is well known, but existing studies mainly focus on regional-scale processes, urban forests, and daily mean or maximum temperatures. Despite their importance, these studies are unable to capture the effects of different urban vegetation strategies at the scales that are relevant for urban design. Specifically, it is not clear whether the ways in which urban trees are clustered and arranged will impact on pedestrians' perception of temperature. This project aims to address this knowledge gap by combining field observations with state-of-the-art modelling. The student will use existing data collected during an experimental campaign in summer 2019 within the ongoing InfruTreeCity project, that aims to advance our understanding of the interactions between urban trees and the built environment. Seven containerized trees, representing urban trees, were placed in a controlled microenvironment at Hall Farm, University of Reading, in two different arrangements (linear and circular). The student will investigate the impact of such clustering arrangements on above- and below-canopy conditions using the collected data on radiative energy exchanges, soil moisture conditions, and tree physiological responses. The student will also employ a mechanistic soil-plant model that synthesizes the state-of-the-art knowledge on individual processes and coupling mechanisms drawn from the disciplines of hydrology, plant physiology, and ecology, to clarify the processes linking plant water use, the arrangement of trees, and local microclimatic conditions.

Project supervisor(s): Dr. Christos H. Halios

What will the outcomes of the placement be?

Student outcomes:

• The student will gain hands on experience in several stages of the research, including reviewing the literature, analyzing the data, using a model to further investigate the relevant processes, and presenting and writing up the results. • The supervisor and members of the team will work with the student in meetings at least once and preferably twice a week at all stages to provide training and expertise in each area. • General transferable skills to be developed include independent and team-working, computing and analytical skills, report writing and presentations skills.

What tasks will the student undertake?

A suggested time plan is given below, assuming a student is working 4 1/2 days a week for 6 weeks. Under supervision, the student will: • review targeted sections of literature under supervisor's guidance. (week 1). • Data analysis (weeks 2 and 3). • Model application of the data (weeks 4 and 5). • Writing of report and presenting the results at the research group meeting (week 6). The placement could comprise two 3-week periods, with the data analysis carried out in one block, and the model application in the second block.

What skills/knowledge/experience will the student need?

Essential skills: • The student is expected to have a background in one or more of the following areas: environmental science/ mathematics/ physics/ meteorology/ engineering. • Competence with computers, e.g. in particular, experience in a computer programming language (Python, R or MATLAB). • The student will need to be flexible, reliable and hardworking. • An understanding of the importance of

the scientific method. • Willingness to attend the Energy and Environmental Engineering research group meetings. Desirable skills • A genuine interest and enthusiasm for the study of natural based solutions for urban problems. • Previous experience of handling data and knowledge of statistics is desirable. • Previous experience of running models in matlab will be welcome.

CONSTRUCTION MANAGEMENT

Title: Classification of wind power ramp events

Project Summary

One of the great challenges to the safe integration of wind energy into power grid are ramp events, defined as large changes in energy generation over a short time period. Wind ramps, caused by wind speed fluctuations, are associated with a variety of meteorological phenomena across several temporal and spatial scales, including development or movement of large-scale weather systems, complex terrain effects, or sea breezes. Commonly, ramp events are identified in the wind power energy time series, considering mainly the magnitude of the change in energy for the given time period. This proposal aims to deepen our understanding on their nature by accounting for different categories of wind ramp events and to identify the wind flow regimes that are associated with each category of wind ramps. The student will apply a simple linear technique that extracts ramp events and classifies them in eight categories to a wind energy dataset from Thames estuary wind farm. Then, the student will classify the wind flow conditions that are prevailing during the identified wind ramps into recirculation, stagnation and ventilation categories, by using a simple mathematical technique that analyses wind data taken at fixed time intervals. This methodology had been successfully used recently to identify coherent structures in air temperature time series and link them to meso-scale flow patterns (Halios et al., 2018). Halios C.H., Flocas H.A., Helmis C.G., Asimakopoulos D.N., Mouschouras P.G. (2018). Observations of Local Meteorological Variability under Large-Scale Circulation Patterns over Athens, Greece. Atmosphere, 9, 25; doi:10.3390/atmos9010025.

Project supervisor(s): Dr. Christos H. Halios

What will the outcomes of the placement be?

Student outcomes:

• The student will gain hands on experience in several stages of the research, including reviewing the literature, analyzing the data, and presenting and writing up the results. • The supervisor will work with the student in meetings at least once and preferably twice a week at all stages to help them develop new skills and expertise in each area. • General transferable skills to be developed include independent and team-working, computing and analytical skills, report writing and presentations skills.

What tasks will the student undertake?

A suggested time plan is given below, assuming a student is working 5 days a week for 6 weeks. Under supervision, the student will: • Review literature, and familiarise with datasets (week 1-2). • Classification of the wind ramps (week 3). • Classification of the wind flows and analysis of the associations between wind ramp and wind flow classes (week 4,5) • Writing of report and presenting the results at the research group meeting (week 6). The placement could comprise two 3-week periods, with the literature review and wind ramp classification in one block, and analysis of the associations between wind flows and wind ramps in the second block.

What skills/knowledge/experience will the student need?

Essential skills: • The student is expected to have a background in one or more of the following areas: engineering/ meteorology/ environmental science/ mathematics/ physics • Competence with computers, e.g. in particular, experience in a computer programming language (Python, R or MATLAB). • The student will need to be flexible, reliable and hardworking. • An understanding of the importance of the scientific method. • Willingness to attend the Energy and Environmental Engineering research

group meetings. Desirable skills • A genuine interest and enthusiasm for the study of natural based solutions for urban problems. • Previous experience of handling data and knowledge of statistics is desirable. • Previous experience of handling data and knowledge of statistics is desirable.

BIOLOGICAL SCIENCES

Title: Characterizing the impacts of insect herbivory on the rhizosphere microbiome of plants.

Project Summary

Induced systemic resistance (ISR) is an important mechanism in plants where they select plant growth promoting bacteria and fungi in the rhizosphere to enhance their defences against pathogens and insect herbivores. These defence responses are regulated by complex signalling networks involving phytohormones such as salicylic acid, jasmonic acid and ethylene. Whiteflies are known to elicit salicylic acid dependant resistance responses in plants. Secretion of salicylic acid by plants to the rhizosphere modulates colonization by specific bacterial colonies. In this project, our main objective will be to identify the specific bacterial colonies that assemble in the rhizosphere in response to whitefly attack on plants and how this differs between soils under different tillage systems. The plants will be grown in different soil types under controlled conditions before infesting them with whiteflies. The initial and final microbial population of soil will be determined by various microbiological and molecular techniques. The student will also be involved in sampling and analysis of salicylic acid from leaf and root samples. The study will help to understand the difference in rhizosphere microbial assembly that occurs during an insect attack and the influence of phytohormones in recruiting specific population. This project will also help in understanding the effect of various farming and tilling techniques on microbial populations of the soil.

Project supervisor(s): Glyn Barrett

What will the outcomes of the placement be?

Student outcomes:

• Soil and plant sampling techniques • Maintaining whitefly population • Safe laboratory skills in handling and maintaining microbial colonies. This will involve isolation, purification, identification and storage of environmental microorganisms. • Leaf and root analysis of plant to estimate phytohormone levels, Student will learn to extract salicylic acid from plant parts and quantify them by HPLC using appropriate standards. • Advance skills in molecular biology techniques involving DNA extraction, PCR, sequencing and bioinformatics analysis.

What tasks will the student undertake?

• The student will assist in soil sampling, culturing and isolation of microbial populations. Various microbiological and molecular techniques will be used to characterise and identify the isolated strains. • The student will be involved in the growing, maintaining and sampling of plants. The student will learn extraction and analysis (using High Pressure Liquid Chromatography) of salicylic acid and other target species in plants.

What skills/knowledge/experience will the student need?

- Registered onto an appropriate degree at home university - Previous molecular and microbiological knowledge - Willingness to work in field and handle soil, insect and plant samples.

BIOLOGICAL SCIENCES

Title: The impact of dementia on social behaviours: simple model for a complex question

Project Summary

Aging in humans is often marked with slow progressive decline of social cognition and motivation. C. elegans, the first organism whose neural network has been completely mapped, has been widely used as model for human aging and disease. Our approach, initiated during 2018, was to correlate one type of social behaviour (i.e. male mating behaviour) with the shorter or longer lifespans of C. elegans mutants. Our recent collaborative UROP project showed that mutations in the conserved longevity regulating insulin signaling pathway shows complex mating behaviour patterns with short lived worms being quicker in some aspects of mating behaviour. Additionally, we showed that a wild-type isolate of C. elegans that shows increased sociality display increased mating behaviour and have a longer lifespan than the wild-type isolate with solitary life style. These results suggest a strong relationship between sociality and longevity of this species. Aging is the strongest risk factor for many neurodegenerative diseases, including Alzheimer;s disease. Interestingly, epidemiological studies suggest that social isolation is associated with more rapid decline of cognitive function linked to age-related neurodegenerative disorders in humans. Changes in social behaviour on the other hand are amongst the early signs of Alzheimers disease, and it is a disease-associated symptom in many neurodegenerative diseases linked with dementia. In this project, we will assay specific, recently described social behaviours in worm models of Alzheimer's disease. If successful, this project will enhance our understanding how sociality impacts health of the organism, and it will delineate a novel role for Alzheimer's disease genes in these behaviours.

Project supervisor(s): Dr Eva Kevei/ Dr Nandini Vasudevan

What will the outcomes of the placement be?

Student outcomes:

The student will learn a mix of both technical skills in the laboratory and analytical skills that will be useful in both research and non-research careers. The student will learn a) to read and analyze scientific literature pertaining to this area b) learn to culture C. elegans worms and microscopically analyze them c) set up mating behaviour assays d) "score" social behaviours e)) to analyze data using a range of software programs including Graph Pad Prism, ImageJ and Microsoft Excel and g) to interpret and present the data. This is a stand-alone project and the student can participate in this project from the beginning i.e. read and perform the experimental paradigm to the end i.e interpret data. If successful, this would add to already existing data derived from a previous UROP project that will most likely lead to publication or poster presentation.

What tasks will the student undertake?

The student will learn how to maintain and manipulate the model organism C. elegans, including how to do genetic crosses of different C. elegans mutants, monitor and assay social behaviour, memory and learning of the worms and learn to do complex analysis of these behaviours. The student will set up behavioural analysis experiments with various mutants and at the end of data collection, the student will be taught to analyze and interpret their data.

What skills/knowledge/experience will the student need?

No laboratory experience is required; knowledge of endocrinology or biomedical science or genetics is desirable but not essential.

BIOLOGICAL SCIENCES

Title: Development of a Polio Virus-Like Particle Vaccine in Escherichia coli

Project Summary

Poliovirus (PV) is a non-enveloped RNA virus that replicates within the human gastrointestinal tract. In a small proportion of cases (<1%) the virus spreads from the intestines to the central nervous system (CNS) causing damage to neurons that results in muscle weakness and paralysis (poliomyelitis or polio). Mass vaccination programmes have successfully eradicated PV from all but three countries (Nigeria, Afghanistan and Pakistan) using a combination of two vaccines: a live-attenuated oral Polio vaccine (OPV) and an inactivated Polio vaccine (IPV). If the Global Polio Eradication Initiative is successful it will be necessary to continue to vaccinate against Polio for many years to prevent its reappearance. Whilst current Polio vaccines are effective, they are produced using live PV which could be released from manufacturing plants either accidentally or intentionally. It is therefore necessary to develop a safer Polio vaccine for the post-eradication era. Virus-like particles (VLPs) are empty protein shells that mimic the structure of a virus capsid but are unable to cause disease and do not require live virus at any stage of production. The host laboratory has already cloned a set of recombinant E. coli strains carrying vectors that express SUMO-tagged Polio capsid proteins. The aim of this project is to optimise the conditions required for expression, purification and removal of the SUMO tag from the capsid proteins in vitro. The potential for SUMO protease to remove the SUMO-tag inside the E. coli cytoplasm without the need for lysis and purification will also be investigated.

Project supervisor(s): Dr Geraldine (Jay) Mulley

What will the outcomes of the placement be?

Student outcomes:

This project offers an excellent opportunity for you to develop your practical skills in molecular genetics. You will be trained how to use several pieces of specialist laboratory equipment such as the G-box, plate reader and ultracentrifuge. You will gain confidence with routine techniques such as SDS-PAGE which will help you to adopt a more independent approach to laboratory based-research.

What tasks will the student undertake?

In this project you will gain experience of a variety of molecular techniques commonly used in vaccine development including DNA cloning, protein expression in E. coli, cell lysis, SDS-PAGE, western blots, enzyme reactions and ultracentrifugation.

What skills/knowledge/experience will the student need?

Any student with relevant practical experience is welcome to apply, but this project is most suited to a student studying Biomedical Sciences or Microbiology.

BIOLOGICAL SCIENCES

Title: Determining the presence of bacteria associated with tree diseases in samples from wild birds

Project Summary

Acute Oak Decline is an emerging tree disease that has recently impacted woodland communities across the UK. Studies have found certain bacterial strains associated with diseased trees, giving scientists reason to believe the bacteria are causal agents of the disease. The method in which the disease is transmitted from one tree to another is not yet fully understood. This project is integrated with an ongoing PhD study, which aims to understand the role woodland birds play in the transmission of these diseases. This laboratory-based project will use faecal and body swab samples taken from wild caught birds earlier in the year. The student will use a combination of microbiological and molecular techniques to isolate, purify and identify bacteria present in these samples. Community microbiome analysis will proceed via 16S ribosomal RNA (rRNA) gene amplicons. The outputs will be compared against previously known RNA sequences of the disease causing bacteria to determine their presence or absence in the samples. There may be the opportunity for the student to assist with sampling collection in the field, depending on the start date of the project.

Project supervisor(s): Glyn Barrett

What will the outcomes of the placement be?

Student outcomes:

- General and advanced laboratory skills especially in proper and safe microbiological standards. This will include isolation, purification, characterisation, identification and storage of environmental microorganisms. - Advanced skills in molecular biology including but not limited to PCR and DNA extraction and sequencing with follow on bioinformatics analysis (QIIME2). - Possibility of bird trapping, handling, tagging and collection of biometric data and swab samples.

What tasks will the student undertake?
- Working in the laboratory they will characterise the bacterial communities taken from swabs and faecal samples using a range of microbiological and molecular tools. - The possibility of humanely capturing wild birds to take foot and beak swabs, and faecal samples

What skills/knowledge/experience will the student need?
- Registered onto an appropriate degree at home university - Previous molecular and microbiological knowledge - Willingness to handle birds in a field environment

BIOLOGICAL SCIENCES

Title: Innovative delivery of imaging probes into human platelets to investigate platelet function

Project Summary

Platelets are small cells in the blood which, when activated, play a critical role in the prevention of excessive bleeding at sites of injury. Conversely, inappropriate platelet activation can lead to heart attack and stroke. An understanding of the molecular mechanisms governing platelet activation and function is fundamental to understanding how platelets impact health and disease and to the identification of new and improved drug targets. As platelets lack a cell nucleus standard molecular biology methods, used to study biological processes in nucleated cells, cannot be used. Although transgenic mouse models have advanced our understanding of platelet biology by the genetic deletion of genes or the expression of fluorescent protein markers, these are not always a suitable alternative to investigate human platelet function. Therefore the development of an accessible, cost effective method to deliver compounds into human platelets will significantly enhance the ability to investigate the molecular mechanisms governing human platelet function. This project will build on a previous UROP project which demonstrated that fusogenic liposomes can label human platelets without impacting their normal function. This project will investigate the ability of fusogenic liposomes to deliver imaging probes into human platelets and use these to dynamically visualise the subcellular localisation of proteins. Based within the School of Biological Sciences, the student will apply several techniques to characterise liposome mediated antibody delivery. Experimental techniques will include flow cytometry and advanced microscopy. Experimental data acquired by the student will contribute to a larger research proposal and may lead to a publication authorship.

Project supervisor(s): Alice Pollitt

What will the outcomes of the placement be?

Student outcomes:

The student will gain experience of working as part of a team within a research environment of several closely related laboratories. These laboratories will all benefit from the research outcomes of this project. By taking ownership of the project the student will gain experience in how to plan, organise, perform, analyse and interpret research at the forefront of platelet research. During this project the student will become proficient in platelet function assays and transferable skills such as flow cytometry and advanced microscopy. Moreover, they will gain experience in the communication of research by presenting their data as an oral presentation and as a final, publication quality short report. This project will form the basis of an innovative research avenue which will benefit laboratories from both SBS and Pharmacy. Data from this and a previous UROP project will be combined and together will form solid preliminary data for a funding proposal to the NC3Rs and will result in a future authorship for the student.

What tasks will the student undertake?

The majority of the student's time will be spent preforming laboratory based research within an environment of PhD and Masters students. The student will research the effect of fusogenic liposomes on platelet function using a variety of platelet function tests including platelet aggregometry, flow cytometry and microscopy. The student will test the approach by using fusogenic liposomes to deliver a fluorescently labelled antibody into human platelets and use these to dynamically visualise cellular processes. Approximately 20% of the student's time will be spent reading relevant literature, analysing

and interpreting data. The project will conclude with a presentation of the project outcomes to colleagues form several closely related research groups.

What skills/knowledge/experience will the student need?
Students from all areas of life sciences are welcome to apply and no specific knowledge or experience is required as specific training will be provided. The appointed applicant will have to be organised, motivated and comfortable with calculations. Due to the nature of this project it may be of particular interest to students with a chemistry background wishing to apply their knowledge of chemistry to tackle a biological problem. As the student will work with human blood a HepB vaccination would be required prior to the project start.

PHARMACY AND CHEMISTRY

Title: Developing novel mucoadhesive polymers for drug delivery

Project Summary

Mucus is a fully hydrated viscoelastic gel that covers the surface of the eye, nose, mouth, respiratory tract, cervix, and gastrointestinal tract. Adhesion of pharmaceutical products to mucus or mucous membranes is referred to as mucoadhesion. Over the last decades, mucoadhesive polymers have been used widely in designing drug delivery systems to improve buccal, nasal, oral, ocular and vaginal administration of drugs, and considerable attention has been paid to the development of novel mucoadhesive materials. Chitosan is one of the polymers exhibiting the ability to adhere to mucosal surfaces. This project will be aimed to develop chemically modified chitosan with enhanced mucoadhesive properties. Chitosan will be reacted with small molecules bearing mucoadhesive functions and the resulting product will be purified and subsequently characterised using nuclear magnetic resonance and Furrier-transformed infrared spectroscopy, thermal methods of analysis. Physicochemical properties of chitosan and its derivatives will be studied in solutions at different pHs. Interactions between chitosan and mucus components will be studied by rheological techniques. Then the parent chitosan and its derivatives will be used to formulate model dosage forms (liquid formulations and coated tablets). Retention of liquid formulations on freshly excised animal mucosal tissues will be studied using fluorescent microscopy-based flow-through technique. Adhesion of liquid formulations and tablets to mucosal tissues will also be studied using texture analysis. Toxicological properties of novel derivatives will be evaluated using in vitro techniques.

Project supervisor(s): Prof Vitaliy Khutoryanskiy

What will the outcomes of the placement be?

Student outcomes:

The student will learn different experimental skills including the synthetic methodologies, purification techniques, physicochemical methods of analysis and work with animal tissues.

What tasks will the student undertake?

The student will be performing all the experiments, including the synthesis, characterisation and studies of mucoadhesive properties. All training on these experimental techniques will be provided. In the end of the placement the student will be required to prepare written report of their work and also will be expected to present and discuss their findings at the Khutoryanskiy group meetings.

What skills/knowledge/experience will the student need?

The student should have a solid understanding of chemistry, in particular knowledge of polymers and some physicochemical methods of analysis.

PHARMACY AND CHEMISTRY

Title: Protocol development for the novel use of a crystallisation robot tailored to suit early stage drug discovery

Project Summary

Early stage drug discovery comes with various challenges; one of the biggest is the necessity to acquire as much structural information as possible from a very limited amount of material (ca.1 mg). In most cases, the structural information can only be obtained if a suitable quality single-crystal is produced; otherwise drug development must proceed without this important information, to the detriment of important decision making. Conventional crystallisation experiments require large amounts of material, which are simply not available in the early stages. Fortunately, the crystallisation experiments are amenable to automation, reducing not only the time needed to obtain a suitable crystal, but also drastically reducing the amount of drug required. A recent EPSRC equipment grant, led by Dr Hall, Dr Kabova and Dr Allman, has allowed us to purchase an Oryx 8 crystallisation robot, opening new opportunities for automated crystallisation. The aim of this project is twofold: 1) to adapt the use of the Oryx 8 robot, which is designed to handle protein molecules, to small drug-like molecules instead, exploring different crystallisation conditions; and 2) to establish key protocols of the optimal way to recrystallize small molecules on a microgram scale. This protocol will lay the foundation for unlocking the potential of crystallisation in the early stages of drug development – a crucial task for industry and academia alike. Moreover, the methodology will be applicable not only to active pharmaceutical ingredients, but also to co-crystals, pesticides, dyes and foodstuffs.

Project supervisor(s): Dr Elena Kabova

What will the outcomes of the placement be?

Student outcomes:

The skills expected to be developed by the student, mapped to the Research Development framework are as follows: Domain A: Knowledge and intellectual abilities • Expanding subject knowledge – particularly relevant to the Pharmaceutical industry • Research methods- Information seeking and management; academic literacy and numeracy • Data interpretation and evaluation, problem solving, and critical thinking Domain B: Personal Effectiveness • Responsibilities, integrities and perseverance, resulting in gains in self-confidence • Workload planning and management • Time management • Responsiveness to changes Domain C: Research governance and Organisation • Project planning and delivery • Health and safety, risk management and good laboratory practice Domain D: Engagement, influence and impact • Teamwork, collaborations and collegiality • Communication methods, media and publications – data recording, written and oral communication of results

What tasks will the student undertake?

Initially, the student will familiarise themselves with the process of crystallisation and its importance through literature study. They will propose a project procedure, which will be discussed and refined in collaboration with the supervisors. Laboratory work will include the use of Oryx 8 and systematic studies of crystallisation experiments with various pharmaceutical materials and solvents on a small scale (a few mg and a few μL) The robustness of crystallisation plate materials will be explored against a variety of solvents. Any crystalline materials obtained will be analysed in the CAF, primarily with the use of X-ray diffraction techniques. Finally, the student will be expected to keep high quality records of experimental procedures, to write up the results in the form of a report and produce a standard operating procedure for the most efficient crystallisation methodologies.

What skills/knowledge/experience will the student need?

This post will be suitable for students in the science and life science degrees. The student should be self-motivated and be able to work independently. The student should have previous laboratory experience and general interest for experimental research. Previous experience with report writing will be advantageous.

PHARMACY AND CHEMISTRY

Title: Developing pharmacological resources

Project Summary

The School of Pharmacy has recently introduced a new BSc Pharmacology programme with Gary Stephens as Programme Director. We are seeking to develop protocols for useful, ethical practical and assessment exercises to support the learning aims of the Part 1 module 'Principles of Drug Action' convened by Mark Dallas. Thus, key learning aims for this module are to "explain drug effects through the modulation of receptors" and to "describe pharmacological concepts such as agonism and antagonism". Vitaliy Khutoryanskiy has recently developed a biological assay of motor function (movement) using simple planarian worms. In this system, worms can be exposed to fixed concentrations of activating (agonist) drugs, including stimulants such as dopamine. In order to develop this protocol, we will use suitable reference drugs as follows: 1) Application of agonist drugs will be used to demonstrate the key concept of 'dose-response relationships', whereby increasing concentrations of agonist will be applied and movement responses measured as distance the worm moves (on graphical paper and exploration of automated analysis), Using a range of agonists and agonist concentrations, an S-shaped sigmoidal 'dose-response curve' will be generated. From this, key pharmacological parameters, including EC50 (effective concentration producing 50% of maximal response) and efficacy at the receptor, will be measured. 2) To illustrate the concept of receptor antagonism, the blocking effect of known antagonists on agonist responses, such as haloperidol block of dopamine effects, will be used. Using different concentrations of antagonist, measures of receptor binding affinity (another key pharmacological parameter) can be generated.

Project supervisor(s): Gary J Stephens

What will the outcomes of the placement be?

Student outcomes:

An appreciation of research design. An appreciation of teaching and assessment requirements.

What tasks will the student undertake?

The student will undertake the following tasks: 1) develop a working protocol to assay effects of reference agonist and antagonist drugs on planarian movement 2) undertake measurements of agonist and antagonist drug effects on planarian movement 3) analyse and graphically present obtained data 4) write-up a workable protocol to be used in undergraduate practicals including model data and analysis

What skills/knowledge/experience will the student need?

Knowledge of biological assays and experience of their practical implementation. Data analysis and presentation skills (e.g. Excel) Good writing skills (e.g. Microsoft word)

PHARMACY AND CHEMISTRY

Title: Citizen science: enlisting people help us evaluate the real magnitude of medicinal waste and disposal practices

Project Summary

This project supports a research collaboration (est. Feb. 2019) between Pharmacy and Biomedical Engineering, ReMINDS (Reuse of Medicines through Informatics Networks and Digital Sensors), which explores medicines reuse for tackling medicinal waste. With several internal grant successes, we are becoming trailblazers in the up-and-coming area of sustainable pharmacy. This proposed UROP project is in line with the university's principle of sustainability and contributes to both Agriculture, Food and Health and Environment research themes. This project will collect up-to-date information about medicines waste and disposal practices, through citizen science; scientific work done by ordinary people with an interest in the field but without any special qualifications. We will enlist people's help not only because medicinal waste is a universally accepted problem within the NHS but also because existing knowledge in the field is now dated. The highly referenced report (https://discovery.ucl.ac.uk/id/eprint/1350234/1/Evaluation_of_NHS_Medicines_Waste__web_publication_version.pdf) evaluating medicines waste, estimating a £300m/year cost to the NHS, is now a decade old. Another problem is that inappropriate disposal (e.g. in bins or sink/toilet) of medicines remains hidden within people's homes and is largely unexplored. Unsafe disposal means medicines reach rivers, groundwater, soil, and even drinking water, with a detrimental impact on the environment and implications, for example, for antibiotic resistance. It is timely that these problems are reviewed and the situation updated. Our project will establish an app/web platform and media campaign to raise awareness of medicines waste and unsafe disposal practices, with a key aim being to collect photographs and information about medicines accumulated and/or thrown away.

Project supervisor(s): Professor Parastou Donyai

What will the outcomes of the placement be?

Student outcomes:

This project will address the following questions: How much medicinal waste (e.g. unwanted, unused, expired items) is being accumulated in people's homes? What types of medicines are being accumulated and why? How much and what type of medicinal waste is being returned to pharmacies for safe disposal? How much and what type of medicinal waste is being disposed of in the home (e.g. in the bin or through the sink)? Quantification of this information will help toward external grant applications being made to various research councils (e.g. PRUK, EPSRC). An abstract for submission to the annual conference of the Royal Pharmaceutical Society.

What tasks will the student undertake?

Complete a literature search to learn about existing research on medicinal waste and disposal practices (week 1) Learn how to use Bristol Online (a platform for collecting survey data) (week 2) Identify how to develop an app/web platform for securely collecting photographic submissions capturing medicinal waste accumulated in the home (week 3) Design and create a means through which people can submit both factual written/textual and photographic information about medicinal waste and disposal practice (week 4) Design a media campaign for recruitment of citizen scientists (week 5) Launch the citizen science project and prepare a summary of the project (week 6)

What skills/knowledge/experience will the student need?

Good writing skills Ability to work methodically and analyse text. Genuine interest in sustainability. Open-mindedness and flexibility Experience /interest in app/web design Good time management and ability to meet goals set

ECOMONICS

Title: Measuring international flows of waste electrical and electronic equipment

Project Summary

The aim of this project is to quantify international flows of electrical and electronic equipment waste (e-waste or WEEE). The primary focus is on trade flows from the EU towards Sub-Saharan African countries in order to provide an overview of the size of the market for electronic and electrical products from which e-waste arises and over-time variations. This project will offer the student the opportunity to learn about trade in E-waste and its measurement, gain first-hand experience in using a large dataset on bilateral trade flows, and produce useful statistics that will feed into a research project on the impact of e-waste dumping sites on child health in Nigeria, Ghana and Tanzania.

Project supervisor(s): Stefania Lovo

What will the outcomes of the placement be?

Student outcomes:

The student will gain knowledge regarding the topic of transboundary waste flows, The student will also gain awareness of the available data on trade flows and their usefulness in understanding the broader implications of international trade. He/She will also gain a good understanding of the methodologies available to measure trade flows of e-waste. Transferable skills the student will develop include: the ability to understand state-of-the-art methodologies and apply them to existing databases, Excel and Stata skills, time management skills. The student will also develop specific skills including statistical analysis techniques such as basic descriptive analysis using graphs and tables.

What tasks will the student undertake?

The successful applicant will begin by conducting a review of the relevant literature on the measurement of volumes of e-waste to determine the most appropriate methodology. Relevant papers will be provided to the student. The student will then use data on bilateral trade flows, which will also be provided, combined with the Classification of E-waste under the Basel Convention to quantify the amount of e-waste transfered between countries. Hence, with the support of two supervisors (the other being Sam Rawlings), the student will: 1) Review the existing methodologies to measure international flows of e-waste (20%) 2) Analyse data in Stata and/or excel (60%). 3) Provide descriptive statistics using the constructed measures of trade flows (20%).

What skills/knowledge/experience will the student need?

Intellectual curiosity in particular in relation to the topic of transboundary waste flows and a keen interest in conducting data analysis. Research skills to produce basic descriptive statistics in the form of tables and graphs. Basic familiarity with Stata. Good knowledge of Microsoft Excel.

ECOMONICS

Title: Women in Football

Project Summary
There is a large body of evidence on barriers to leadership positions faced by women, and a related literature on the relative benefits of the presence of women managers in firms. These range from innovation (IMF, 2016), to firm performance and pay gaps: Flabbi et al (EJ 2019) for example use panel methods and a matched employer-employee data set and find that performance in firms with female leadership increases with the share of female workers, which they interpret as a better ability of female leaders to read signals from workers of the same gender. There is however also evidence from other papers pointing to backlash from male workers who dislike being managed by a woman (Brescoll et al, 2018). To investigate these mechanisms De Paola et al (IZA, 2018) conduct a field experiment with students and find a positive and significant effect of female leadership on team performance which is driven by the higher performance of team members in female led teams but that in spite of this male members tend to evaluate female leaders as less effective, whereas female members are more sympathetic towards them. Football presents a unique opportunity to study these mechanisms in more detail as teams are by definition completely segregated by gender and therefore the manager men and women ought to equally compete for managerial roles, and be evaluated on the same criteria. The disparity between women managing in mens football, and men managing in womens football suggests a different reality. What can be learnt about the dynamics surrounding the sackings and quits in womens football, relative to those in mens football, from historical data on results? Boards of directors, and officials. Football has extremes of all men, all women teams. Are things symmetric?

Project supervisor(s): James Reade

What will the outcomes of the placement be?
Student outcomes:

The student will be able to develop their research skills via their literature search, and develop their data handling skills, plus their data analysis skills via the empirical work in the project. They will also develop presentational skills via weekly meetings to present findings.

What tasks will the student undertake?
This project asks the student to carry out classic research tasks. The initial task for the student will be to familiarise themselves with the literature; this means to understand both the theoretical contributions of relevance, and any empirical work that has been carried out. This stage will inform the subsequent task: hypothesis formulation, and data collection. Throughout, the essential task of presenting findings will be vitally important.

What skills/knowledge/experience will the student need?
The student will need experience of economics as a subject area from a theoretical perspective, knowledge of research methodology, and also of data collection, for the empirical side of the project. The student will need to be familiar with carrying out literature searches, and summarising the findings of other research studies.

ECOMONICS

Title: The impact of football clubs on the local area

Project Summary

Football clubs are historical institutions in towns and cities around the country. They are a source of employment, of local pride, of leisure investment, and can act as free advertising for the town or city. The success or otherwise of football clubs has external effects; a local team in the Premier League can make a difference for university recruitment, for example, or occupancy rates at hotels. Equally, prosperous local areas may well have stronger football clubs as the club is able to extract more revenue from local residents than would be possible in poorer parts of the country. This project will firstly conduct a thorough literature review on the topic area before sketching out a number of potential channels through which local football club success may affect the local area (taking care of potential reverse causality). Following this, a panel dataset will be constructed of relevant data variables for an empirical investigation of the hypotheses formed, looking at as many football clubs and towns and cities as possible across the UK.

Project supervisor(s): James Reade

What will the outcomes of the placement be?

Student outcomes:

The student will be able to develop their research skills via their literature search, and develop their data handling skills, plus their data analysis skills via the empirical work in the project. They will also develop presentational skills via weekly meetings to present findings.

What tasks will the student undertake?

This project asks the student to carry out classic research tasks. The initial task for the student will be to familiarise themselves with the literature; this means to understand both the theoretical contributions of relevance, and any empirical work that has been carried out. This stage will inform the subsequent task: hypothesis formulation, and data collection. Throughout, the essential task of presenting findings will be vitally important.

What skills/knowledge/experience will the student need?

The student will need experience of economics as a subject area from a theoretical perspective, knowledge of research methodology, and also of data collection, for the empirical side of the project. The student will need to be familiar with carrying out literature searches, and summarising the findings of other research studies.