STEM Research Day

UCD Village Auditorium

22nd March 2023

College of Science

College of Engineering & Architecture

College of Health & Agricultural Sciences

Introduction

STEM Research Day: Promoting Cross Team Collaborations

The aim of this event is to stimulate cross-School/College collaboration and raise the impact of research in UCD. The Research Day will (i) give academics the opportunity to put forward a specific research challenge they are trying to overcome, through identifying suitable collaborators; and (ii) provide a networking environment for researchers to forge new ideas and build new collaborations. The hope is that these interactions will lead to world-class research outputs and joint funding applications and enable research ideas to reach their full potential.

Following the Research Day, a STEM funding call will be announced, and seed funding will be available to support highly-collaborative and high-impact research. The lead applicant must be from one of the three organising Colleges, but researchers from right across UCD are encouraged to collaborate.

Event Agenda

NOTE: Adobe Acrobat is the recommended PDF reader to ensure hyperlinks are functional on mobile devices.

Registration (1st Floor Balcony) *Tea and Coffee on arrival*	**9:00 – 9:30**
Welcome Remarks (Main Auditorium)	**9:30 – 9:45**
Flash Talk Session 1 *List of speakers (click here)*	**9:45 – 11:00**
Networking Session with light refreshments *Flash Talk Session 1 speakers will be available for networking in Breakout Room 4 (click here) & Breakout Room 5 (click here)*	**11:00 – 11:45**
Flash Talk Session 2 *List of speakers (click here)*	**11:45 – 13:00**
Networking Session with lunch *Flash Talk Session 2 speakers will be available for networking in Breakout Room 4 (click here) & Breakout Room 5 (click here)*	**13:00 – 14:00**
Flash Talk Session 3 *List of speakers (click here)*	**14:00 – 15:30**
Networking Session with light refreshments *Flash Talk Session 3 speakers will be available for networking in Breakout Room 4 (click here) & Breakout Room 5 (click here)*	**15:30 – 16:15**
Closing Remarks and Information on STEM Seed Funding	**16:15 – 16:30**

Table of Contents

Research Challenge / Expertise required

NOTE: Adobe Acrobat is the recommended PDF reader to ensure hyperlinks are functional on mobile devices.

Session 1 Speakers *(part 1 of 2)*

Room 4 for Networking

Research Challenge / Expertise required

Session 1 Speakers *(part 2 of 2)*

Room 5 for Networking

Research Challenge / Expertise required

Session 2 Speakers *(part 1 of 2)*

Room 4 for Networking

Research Challenge / Expertise required

Session 2 Speakers *(part 2 of 2)*

Room 5 for Networking

Research Challenge / Expertise required

Session 3 Speakers *(part 1 of 2)*

Room 4 for Networking

Research Challenge / Expertise required

Session 3 Speakers *(part 2 of 2)*

Room 5 for Networking

Drug Synthesis, HTS Drug Screening and Biomarker Predictivity **33**

Prof. Breandán Kennedy, School of Biomolecular and Biomedical Science

Computational approaches to understanding protein function **34**

Dr. Rainer Melzer, School of Biology and Environmental Science

Call for users - subsidised UCD high field 9.4T MRI pilot studies **35**

Dr. Jeffrey Glennon, School of Medicine

What have we got? Ireland's trees and woodlands outside the forest **36**

Ms. Sophia Meeres, School of Architecture, Planning & Environmental Policy

UCD Centre for Space Research - Connecting space researchers with space expertise **37**

Dr. Ronan Wall, School of Physics

Expert in microscopy and imaging of all kinds, participate in multiple research projects **38**

Dr. Dimitri Scholz, School of Medicine

Design Thinking Challenge

Ms. Elaine Quinn, Conway Institute

Research Challenge / Expertise required

Research Challenge / Expertise required

Research Challenge / Expertise required

Research Challenge / Expertise required

Research Challenge / Expertise required

Research Challenge / Expertise required

Research Challenge / Expertise required

Research Challenge / Expertise Required

"Looking for applications that will benefit from our machine learning based optimisation techniques"

Dr. Deepak Ajwani

School of Computer Science

deepak.ajwani@ucd.ie

Research Challenge / Expertise Required: We are looking for collaborators with well-defined combinatorial optimisation problems arising from real-world applications (e.g., transportation, network design, logistics etc.). We have a number of powerful machine learning techniques that can speed up the computation of hard optimisation problems, thereby enabling the solution of considerably bigger instances of optimisation problems than what is traditionally possible. We are looking for applications that can benefit from our techniques.

Expected output: Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Invitation to participate at STEAM4LIFE project (academics, industry and students)"

Prof. Eleni Mangina

School of Computer Science

eleni.mangina@ucd.ie

Research Challenge / Expertise Required: STEA4LIFE calls for academics (max 5) and students at any level with focus to female students (max 50) to improve the capacity of HEI staff and students on how to address gender gap issues in the STEAM sector and enhance skills and knowledge at European level on gender inclusion and empowerment in the STEAM sector. UCD is a partner in this EU project and academics and students are more than welcome to join the team and participate in the activities of the project for the next 2 years.

Expected output: Collaborative publication | Collaborative activities and online courses for Educators in STEAM, students and Education Decision Makers

"To investigate proteomic changes over time in adaptation of cystic fibrosis lung pathogens to hypoxia"

Dr. Joanna Drabinska

School of Biomolecular and Biomedical Science

joanna.drabinska@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in bioinformatics that could help us analyze prokaryotic proteomic data. Our project focuses on investigating mechanisms of bacterial adaptation to chronic lung infections in cystic fibrosis. We are particularly interested in hypoxia as a contributor. We are comparing changes in the protein abundance over 28 days in bacteria grown in hypoxic and normoxic conditions. We need help with 1) performing differential proteomic analysis over time, 2) looking for common changes in 3 species. The data could potentially serve as a base for writing further research grants.

Expected output: Preliminary data for grant application | Collaborative publication |

"To develop a device for reproducible growth and imaging of 3D cell culture assemblies"

Prof. Jeremy Simpson

School of Biology and Environmental Science

jeremy.simpson@ucd.ie

Research Challenge / Expertise Required: We have developed a number of 3D cell culture assemblies (spheroids) that serve as disease models. One advantage of these models is that they preserve cell-cell interactions thereby better mimicking physiological conditions found in the body. Our challenge is to grow these spheroids in a more consistent manner, with the capacity to perfuse them with different drug treatments. We are looking for a collaborator who can work with us in designing and producing a device (ideally in a multi-well plate format), which allow large numbers of spheroids to be grown in a manner suitable for high-resolution optical imaging.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Optical Material Expertise Required for Advance Visible Light Communications"

Dr. Xiping Wu

School of Electrical and Electronic Engineering

xiping.wu@ucd.ie

Research Challenge / Expertise Required: Recognized as one of the key techniques in future 6G wireless communications, visible light communication (VLC) is facing significant challenges across the communication area and optical materials. One particular challenge is to separate different spectrum lights without bulky lenses, so that high speed transmission can be achieved through wavelength division modulation (WDM). This requires a joint investigation into fluorescent materials and their communication capabilities. Another prominent challenge is to research novel solar panel materials for a dual-purpose of energy harvesting and wireless communications. This could provide a great boost to power-constrained applications such as Internet of Things.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Gastrointestinal Physiology - looking for collaborations to study disease and microbiome"

Dr. Gavin Stewart

School of Biology and Environmental Science

gavin.stewart@ucd.ie

Research Challenge / Expertise Required: My current research involves the physiological investigation of membrane transporters in the gastrointestinal tract in various species, with a particular interest in both cow rumen and human colon. These studies primarily involve investigating RNA expression (PCR), protein abundance (western blotting) and protein localization (immunolocalization) of transporters crucial to the symbiotic relationship between mammals and their gastrointestinal microbiome. I am looking for collaborators studying human intestinal disease and/or gastrointestinal microbiomes to facilitate joint MSc projects - leading to collaborative publications and grant applications.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Nanoparticle-mediated delivery of STING-agonists as potential new therapy to treat osteosarcoma"

Dr. Fiona Freeman

School of Mechanical and Materials Engineering

fiona.freeman@ucd.ie

Research Challenge / Expertise Required: I am looking for collaborators with expertise in immunology, nanoparticle design and drug delivery to collaborate on a project focused on the development of a new immunotherapy as a potential add-on to conventional chemotherapy to promoting antitumor immune responses as a potential novel therapeutic for osteosarcoma. Our goal is to demonstrate the immunologic and therapeutic impact of STING activation alone, or the synergistic effect when combined with doxorubicin, has not yet been explored in the context of osteosarcoma. The proof-of-concept results as a result of the proposed collaborative project will be fed directly into further grant applications grant.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

"Sustainable Nutraceuticals from Irish Harvested Macroalgae (SunMara)"

Dr. Shanmugapriya Karuppusamy

School of Biosystems and Food Engineering

shanmugapriya.karuppusamy@ucd.ie

Research Challenge / Expertise Required: Shanmugapriya is MSCA research fellow at UCD. SunMara is co-funded by Enterprise Ireland and the European Union, with academic mentor is Prof. Colm O'Donnell of UCD, and also collaboration with Brijesh K Tiwari and James Curtin. Industry mentors are Stephen Fitzpatrick and Henry Lyons of Nutramara Ltd. and Technology Gateway Centre, Food for Health Ireland.

This project aims to develop a novel and scaleup process of marine polysaccharides and utilize cells as a biological factory that can transform into value-added bioactive compounds, which will facilitate the development and manufacture of new functional foods for potential nutraceutical and cosmetics applications in a cost-effective and consistent manner, enabling the industry partner to sustainably grow sales and profitability. This goal is being targeted and evidenced by research outputs to develop my career in market-focused applied research worldwide. Thank you.

Expected output: Collaborative grant application |

"Smart robotic gripping for manufacturing, supply chain, and logistics"

Dr. Stephen Redmond

School of Electrical and Electronic Engineering

stephen.redmond@ucd.ie

Research Challenge / Expertise Required: This project will automate robotic manipulation using a disruptive tactile sensing technology developed at University College Dublin. We can arrange our tactile sensing elements to make artificial skin for robotic grippers, enabling them to feel grip and load forces, to sense slip events to trigger grip-force adjustments. We propose to use this artificial sense of touch to make smart robot grippers, removing the need for extensive customisation during installation; the gripper will just grip the object and adjust the grasp automatically. Once integrated into a wider robotic system, this general-purpose solution will make robotic automation more accessible for Ireland's SMEs.

Expected output: Collaborative publication | Collaborative grant application |

"Sense of agency over movements in a neurorehabilitation context"

Dr. Sigrid Dupan

School of Electrical and Electronic Engineering

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Research Challenge / Expertise Required: Sense of agency is commonly defined as the feeling of being in control of one's own movements, and the changes in the environment resulting from these movements. The sense of agency can be lost when the intended movement and the feedback from the actual movement are incongruent. I am interested in how changes in motor control due to neurological disorders impact the sense of agency, and if there is a link with therapy adherence. I have started investigating this in myoelectric control of prosthetics, but I'm interested in widening my research into other neurorehabilitation practices.

Expected output: Preliminary data for grant application |

"Computational Modelling of the Built Environment"

Dr. Jennifer Keenahan

School of Civil Engineering

jennifer.keenahan@ucd.ie

Research Challenge / Expertise Required: In the advent of greater computational capacity, the opportunity to model the built environment offers huge potential for sustainable design and operation. I have particular expertise in the assessing wind effects on bridges and am looking to connect with potential collaborators for the purpose of joint-funding in this area.

Expected output: Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Enhancing the Performance of Power-to-Biomethane Process by Using Chemically Engineered Catalysts"

Dr. Recep Kaan Dereli

School of Chemical and Bioprocess Engineering

recep.dereli@ucd.ie

Research Challenge / Expertise Required: Green hydrogen produced by using renewable energy is expected to play an important role in the decarbonization of energy systems. However, power-to-biomethane process can be a more sustainable alternative to direct utilization, storage and transport of hydrogen. Power-to-biomethane employs hydrogenotrophic archaea to convert H2 and CO2 to CH4. The project will investigate enhancing the performance of this biological process by using chemically engineered catalysts. A novel biofilm reactor will be developed by using Nickel and Iron doped support materials. The changes in microbial species composition will be monitored. We are looking for collaborators who can contribute to microbiological work (metagenomics).

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

"How to visualise and quantify motility of bacteria"

Dr. Jennifer Mitchell

School of Biomolecular and Biomedical Science

jennifer.mitchell@ucd.ie

Research Challenge / Expertise Required: We are characterising the role of motility in pathogenesis and antibiotic resistance of streptococci. These bacteria move towards preferred carbon sources including sugars and DNA. Our challenge is how to visualise them moving when they are so small and to build a system to quantify their movement at a microscopic level, without oxygen! We have an anaerobic chamber, can you help us see them move???

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Applications for Small Molecules, oligosaccharides & oligonucleotides"

Dr. Eoghan McGarrigle

School of Chemistry

eoghan.mcgarrigle@ucd.ie

Research Challenge / Expertise Required: Across the school of chemistry there is substantial expertise in making molecules and the impact of this work can (and has been in many cases) be augmented through synthesis of targets with applications in other areas, medicines, probes, materials etc. E.g., our group has expertise in making bipyridines, organophosphorus compounds and saccharides. Collaborations could arise with parties with either a specific target or function in mind. We would also be interested in talking to people with experience of oligonucleotide synthesis (through biological or chemical means).

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"To develop a non-invasive device to accurately measure energy expenditure in athletes"

Prof. Kate Pumpa

School of Public Health, Physiotherapy and Sports Science

kate.pumpa@ucd.ie

Research Challenge / Expertise Required: I am looking for a collaborator with expertise in engineering and/or computer science to assist in the development of wearable technology that can be worn continuously during exercise to determine an athletes energy expenditure (particularly during contact sessions in team sport athletes). Current wearable technology cannot be worn during training for a lot of team sport athletes due to the location these devices are worn (i.e. wrist, hip), and their accuracy in estimating energy expenditure in athletes is limited.

Expected output: Collaborative publication | Prototype

"Coarse-grained modeling & Helix mediated protein-protein interactions"

Dr. Aniello Palma

School of Chemistry

aniello.palma@ucd.ie

Research Challenge / Expertise Required: In my team, we are using peptides to synthesise complex nanostructures like cages and nanoparticles. I would like to engage with a researcher with expertise in the field of coarse-grained modelling. We are also developing novel alpha-helix mimetics and would like to engage with researchers interested in studying/disrupting protein-protein interactions.

Expected output: Preliminary data for grant application | Collaborative publication |

"Research challenge in designing a thermochemical reactor for high-temperature heat storage via carbonation-calcination based cycles"

Dr. Veronica Sofianos

School of Chemical and Bioprocess Engineering

veronica.sofianos@ucd.ie

Research Challenge / Expertise Required: Currently my lab is developing a thermochemical energy storage material and the next step is to design and develop a lab-scale reactor prototype that we can demonstrate consecutive cycles.

Expected output: Preliminary data for grant application | Collaborative grant application |

"Co-creating best practice for scalable wetland restoration across Europe"

Dr. Shane Mc Guinness

School of Architecture, Planning & Environmental Policy

shane.mcguinness@ucd.ie

Research Challenge / Expertise Required: Wetlands provide vital ecosystem services, including emissions reductions, water services, biodiversity support, and myriad socio-economic provisions. However, designing co-created solutions to wetland restoration requires a firm understanding of the ecological, social, governance and finance elements included in sustainable solutions, especially if scalable (space and time) restoration is sought. As part of the WaterLANDS project, we propose to assess these elements across our restoration network, but are seeking broad expertise to help catalyse more expansive restoration across Europe. Expertise required includes finance, law (Irish and EU), social justice, behavioural sciences, agricultural science, and community development. Upcoming EU legislation will both support and challenge these restoration ambitions, so a deeper understanding of these would further support our ambitions.

Expected output: Collaborative publication | Collaborative grant application | Joint PhD or MSc project | Expertise, funding and support for expanded outreach and dissemination through the WaterLANDS artist-in-residence programme

"To develop an ex vivo model of cellular crosstalk in the context of human atherosclerosis"

Dr. Monica de Gaetano

School of Biomolecular and Biomedical Science

monica.degaetano@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in vascular cell biology and molecular immunity to collaborate on a project focused on developing an ex vivo model of cellular crosstalk in the context of human atherosclerosis. Our goal is to demonstrate the proof-of-concept that the monocyte-macrophage-foam cell axis crosstalk with other immune cells (from both the innate and adaptive immunity) are a suitable drug target to induce the resolution of that persistent low-grade-inflammation characterising atherosclerosis, a disease of the major arteries, which is the main underlying cause of the vast majority of the cardiovascular events (including myocardial infarction and stroke).

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"To explore the use of appetite inhibitors in overweight ponies to facilitate weight loss"

Dr. Vivienne Duggan

School of Veterinary Medicine

vivienne.duggan@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator to investigate the use of human appetite inhibitors in ponies, in particular to evaluate their safety and their effects on food intake and weight loss. Our goal is to demonstrate the proof-of-concept methodology, including safety, and to publish our collaborative work and apply for joint funding to expand the project.

Expected output: Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Research challenge: would like a broader range of formal collaborators- e.g. chemistry, medicine. Expertise required: Bioinformatics/Big data interpretation- in-house."

Dr. Alison Reynolds

School of Veterinary Medicine

alison.reynolds@ucd.ie

Research Challenge / Expertise Required: Research challenge: expand scope of research with a broader range of collaborators. Would like to have more regular research meetings/dissemination opportunities, combining teams of interested/similarly aligned researchers with those from other areas- as this will provoke debate and new ideas. Other challenges exist in terms of obtaining funding to keep research facilities up to date (particular focus on aquatics). Expertise- currently team lacks expertise to analyse data from transcriptomics projects (on zebrafish models).

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Pathogens with carbohydrate-binding proteins as targets for sugar-containing metallodrugs"

Dr. Joseph Byrne

School of Chemistry

joseph.byrne@ucd.ie

Research Challenge / Expertise Required: With the goal of developing new therapies or diagnostic tools for bacterial and fungal infections, my group build sugar-functionalised metal complexes. We have shown these can target carbohydrate-binding proteins in P. aeruginosa and C. albicans to inhibit adhesion or as sensors. I am seeking new collaborators in human or animal health research with expertise in these or other organisms which could exploit our molecules for further impact, or with whom we could tailor new drug candidates or functional materials. I am also interested in UCD colleagues with whom toxicity for these can be determined.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Protein interactions: in silico protein docking studies to explore virus host interactions"

Dr. Gerald Barry

School of Veterinary Medicine

gerald.barry@ucd.ie

Research Challenge / Expertise Required: An area of interest in my group is protein protein interactions between viruses and the host immune system. We are currently studying a virus protein that binds to a host protein in a novel way and disrupts an innate immune pathway. We also have a mutant version of the virus protein that does not interact with the host protein. We are interested in exploring this interaction in silico to understand the interaction more completely and model why the mutation disrupts the interaction. We have limited experience in the area of protein docking in silico and are keen to learn from an expert about how to do this more effectively and to see if what we hope to do is possible.

Expected output: Collaborative publication | Joint PhD or MSc project |

"Metabolomic profiling of hypoxic cells"

Prof. Cormac Taylor

School of Medicine

cormac.taylor@ucd.ie

Research Challenge / Expertise Required: We would like to understand the impact of hypoxia on cellular metabolic strategy.

Expected output: Collaborative publication | Collaborative grant application |

"Developing accessible, scalable tools to measure marine microplastic pollution"

Dr. Mark Pickering

School of Medicine

mark.pickering@ucd.ie

Research Challenge / Expertise Required: Addressing problems of a global impact requires solutions of a globalizable scale. Marine microplastic pollution is one such problem. While microplastic pollution may be a threat to human, animal and environmental health, before tacking the problem we need to be able to measure it.

Our group has experience in developing low cost, accessible microscopy instruments to democratise access to research tools. We are now attempting to direct these efforts towards the problem of developing low-cost, scalable tools to optically measure microplastics in-situ. We would welcome collaborators with experience in image analysis, machine vision, optics or environmental analysis.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

"To develop a pancreatic cancer-on-chip model of immune cell infiltration"

Dr. Stephen Thorpe

School of Medicine

stephen.thorpe@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in tumour immunology who has methods for the isolation and in vitro culture of immune cells. Our goal is to explore the impact of stromal organisation on immune cell infiltration and interaction with pancreatic cancer organoids. We plan to demonstrate proof of concept methodology on chip, publish our collaborative work, and apply for joint funding to further develop the project.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Clinical collaborators and one health areas"

Dr. David Gomez

School of Medicine

david.gomez@ucd.ie

Research Challenge / Expertise Required: I work in the area of cancer signalling with focus on human cancer. My group uses systems biology, molecular biology and expert in proteomics. I have several projects that could be improved by collaborations with clinicians specially in the area of cancer. I also would like to explore collaborations for applications in one health area. I would be looking for experts in the veterinary side.

Expected output: Collaborative publication | Collaborative grant application |

"SERT as a G protein coupled transporter: establishing in vitro methodology and non-mammalian animal models"

Dr. Jana Haase

School of Biomolecular and Biomedical Science

jana.haase@ucd.ie

Research Challenge / Expertise Required: Currently, the primary research interest in my lab is the regulation of the serotonin transporter (SERT) by Galpha proteins. We hypothesise that the conformational changes associated with SERT- transport activity are coupled with the G protein cycle and that the disruption of the SERT-Galpha interaction underlies the gain-of-function phenotype in autism-associated SERT variants. We are looking for collaborations/expertise in (a) non-mammalian models to study the in vivo effects of Galpha regulation of SERT and (b) methods (preferentially non-radioactive) to provide evidence that SERT can act as a guanine nucleotide exchange factor (GEF) and/or GTPase-activating protein (GAP).

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"The effect of cold atmospheric plasma on the formation of MSC-derived extra-cellular vesicles"

Dr. Daniela Boehm

School of Chemical and Bioprocess Engineering

daniela.boehm@ucd.ie

Research Challenge / Expertise Required: Reactive oxygen and nitrogen species (RONS) generated by cold atmospheric plasma have the potential to modulate cell behaviour, including proliferation, differentiation, cell death and cell communication, through various pathways. We are interested in the effects of cold plasma on mesenchymal stem cells (MSC) and MSC-derived extracellular vesicles (EV) such as exosomes as potent mediators of cell-cell communication that can influence tissue responses to injury, infection, and disease. We are seeking partners with expertise in the isolation and characterization of MSC-derived EVs that can help us assess the effects of cold plasm on MSCs and develop potential applications towards cell therapy.

Expected output: Preliminary data for grant application | Collaborative grant application |

"To functionally segment lesion pathology in a mouse model of spinal cord injury"

Dr. Dearbhaile Dooley

School of Medicine

dearbhaile.dooley@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in bioinformatics to work together on a project focused on understanding the interactions between astroglia and microglia following spinal cord injury in mice. We will make use of a novel transgenic tool (HexB-tdTomato) for assessing microglia in mice (breeding colony recently established at UCD), where the selective, stable, and robust expression of a reporter fluorophore (tdTomato) allows us to track individual cells within a specific region. Our goal is to demonstrate the proof-of-concept methodology, publish our collaborative work and apply for joint funding to expand the project.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

"Stromal-immune cell interaction in chronic inflammatory diseases"

Dr. Mario Manresa

School of Biomolecular and Biomedical Science

mario.manresa@ucd.ie

Research Challenge / Expertise Required: Our lab is interested in investigating pathogenic interactions between fibroblasts and macrophages in the context of inflammatory bowel disease. We also study the factors that modify fibroblast behaviour. We would benefit from collaborations in the areas of mechanobiology and epigenetics. We would also benefit from further clinical collaborators to expand our studies into other areas such as chronic liver or skin diseases. We can offer extensive expertise in primary cell culture, immune-structural and structural-structural co-culture in vitro models, flow cytometry and transcriptomics.

Expected output: Collaborative grant application | Joint PhD or MSc project |

"To develop a platform for upstream therapeutic exosome production"

Dr. Jessica Whelan

School of Chemical and Bioprocess Engineering

jessica.whelan1@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in exosome analysis to collaborate on a project focused on the development of a scalable biomanufacturing platform for therapeutic exosomes. Analytical techniques capable of quantifying and determining quality of the exosomes are required. Our goal is to develop an upstream manufacturing platform, publish our collaborative work and apply for joint funding to expand the project into downstream processing and beyond.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Drug Synthesis, HTS Drug Screening and Biomarker Predictivity"

Prof. Breandán Kennedy

School of Biomolecular and Biomedical Science

brendan.kennedy@ucd.ie

Research Challenge / Expertise Required: 1. Unbiased drug discovery in zebrafish combined with computational drug design has identified potential neuroprotective drugs. We need expertise in small molecule drug synthesis and structure activity analysis.

2. We identified putative biomarker signatures that are predictive of patient survival in cancer. We need mathematical and statistical expertise in the analysis of our signatures in uveal melanoma and other cancers.

3. Looking for expertise to help in high-throughout screening of zebrafish embryos using fluorescent imaging.

Expected output: Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Computational approaches to understanding protein function"

Dr. Rainer Melzer

School of Biology and Environmental Science

rainer.melzer@ucd.ie

Research Challenge / Expertise Required: We are a plant genetics group interested in structure-function relationships of proteins. We are working with enzymes and gene regulatory proteins for which structural data is available, and would like to explore how point mutations may alter the function of the protein. It would be fantastic if we could develop a computational model that predicts the consequences of amino acid substitutions for protein structure, protein-DNA- and protein-ligand-interactions.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Call for users - subsidised UCD high field 9.4T MRI pilot studies"

Dr. Jeffrey Glennon

School of Medicine

jeffrey.glennon@ucd.ie

Research Challenge / Expertise Required: Building on the success of the National Preclinical Imaging Centre (NPIC), a 9.4T MRI system will (finally) arrive in May 2023. We are looking for engaged and enthusiastic UCD researchers to tell us which of their projects they want pilot MRI data for. We will enable 5 pilot projects (and will apply with you for funding) supporting YOUR research in oncology, neuroscience, and biological systems. Equipment, sequence libraries and know-how on structural, functional and tissue metabolism / chemistry MRI applications in vivo and ex vivo are available. Contact us: Dr. Jeffrey Glennon (jeffrey.glennon@ucd.ie) and Emer Conroy (Emer.Conroy@ucd.ie).

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"What have we got? Ireland's trees and woodlands outside the forest"

Ms. Sophia Meeres

School of Architecture, Planning & Environmental Policy

sophia.meeres@ucd.ie

Research Challenge / Expertise Required: I am looking for collaborators with GIS, ecological and/or arboricultural /agricultural expertise to work on analysis of Bluesky's National Tree Map™ (NTM™). The NTM™ is a detailed dataset of trees both inside and outside the forest. Starting with the midlands of Ireland, for which I have the NTM data, my goals are to better understand the "baseline resource", to consider ways in which this resource can be enhanced and expanded, to publish our collaborative work and apply for funding to expand the project.

Expected output: Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"UCD Centre for Space Research - Connecting space researchers with space expertise"

Dr. Ronan Wall

School of Physics

ronan.wall@ucd.ie

Research Challenge / Expertise Required: The UCD Centre for Space Research [C-Space] is a university-wide centre for space-related research, innovation and education. Our purpose is to build partnerships that advance the use of space to address global scientific and societal challenges. This involves direct space research and also with data generated by in-space satellites and technology. This presentation is to introduce C-Space, to call for researchers interested in getting into space research and to invite you to connect with other space researchers. See ucd.ie/space

Expected output: Increased awareness of space research in UCD and increased collaboration opportunities.

"Expert in microscopy and imaging of all kinds, participate in multiple research projects"

Dr. Dimitri Scholz

School of Medicine

dimitri.scholz@ucd.ie

Research Challenge / Expertise Required: I am a cell biologist with 30+ years of international experience in research, technology, teaching, and management. I published 60+ papers in peer-reviewed journals. I like the teamwork of the scientists, doctors, and students committed to science. I love science, microscopes, and working with people. I am an expert in:

cell physiology and ultrastructure; planning and conducting biomedical experiments; light microscopy with all contemporary instrumentations and applications; electron microscopy, including 3D and cryo-methods; correlative light-electron microscopy; immuno-labeling for light- and electron microscopy; confocal microscopy (both classical and spinning disc); live cell imaging and fluorescent proteins; contemporary approaches: FRAP, photo-conversion, TIRF, FRET, FLIM, super-resolution microscopy, etc.; Correlative Light- and Electron Microscopy (CLEM); multidimensional advanced data analysis.

Expected output: Collaborative grant application |

"Enabling Technologies for a Swarm of Space-based Intelligent Gamma-ray Telescopes"

Dr. David Murphy

School of Physics

david.murphy@ucd.ie

Research Challenge / Expertise Required: EIRSAT-1, the first Irish satellite, will launch this year with the GMOD payload, a gamma-ray detector. Looking to the future, more advanced detection techniques can be enabled using more complex instruments and by using swarms of satellites working together. COMCUBE-S is a proposed mission of 36 satellites with advanced gamma-ray instruments. The project requires expertise in:

Programmable Logic - to interface to instrumentation and efficiently process data.

Artificial Intelligence - to intelligently perform data reduction and event detection.

Inter-Satellite Communication Links - to allow multiple spacecraft to cooperate independently of ground control and to report event detection in a more timely manner.

Expected output: Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Development of comparative oncology models of lung cancer"

Dr. Nicola Fletcher

School of Veterinary Medicine

nicola.fletcher@ucd.ie

Research Challenge / Expertise Required: My group is currently performing a pilot study of Jaagsiekte sheep retrovirus (JSRV), which causes contagious lung tumours in sheep. JSRV infection has many parallels with human lung cancers, and is considered a useful model for human disease. We are interested in comparing the biology and response to therapeutics of JSRV lung tumours in sheep with that of humans, and seek collaborators with an interest in lung cancer for a potential grant application.

Expected output: Collaborative grant application |

"Use of mobile robotic platform in bioprocessing and food manufacturing environments"

Prof. Nikolaos Papakostas

School of Mechanical and Materials Engineering

nikolaos.papakostas@ucd.ie

Research Challenge / Expertise Required: The major goal of this research challenge is to explore ways of improving the performance of bioprocessing and food manufacturing processes by employing modern automation technologies. A promising way towards this direction could include the introduction of autonomous mobile robotic platforms that will be capable of performing a series of environmental sampling, production monitoring and parts / good transportation activities. The realisation of such technologies could lead to the increase of production throughput, the minimisation of contamination risks as well as to the development of more cost-efficient manufacturing processes in challenging production settings, including clean-room environments.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Object Oriented Data Modelling"

Prof. Brendan Murphy

School of Mathematics and Statistics

brendan.murphy@ucd.ie

Research Challenge / Expertise Required: Statistical methods for numerical data are well established and widely used. However, much data are complex objects that are not numbers at all. For example, data can be curves, shapes, sequences, permutations, networks or trees, for example. We are interested in Object Oriented Data modelling where we develop models for complex data objects.

Expected output: Collaborative grant application | Joint PhD or MSc project |

"Drosophila biologist seeks collaboration with computer scientists, engineers and health researchers to study pain/health/nutrition/toxicology"

Dr. Olga Baron

School of Biomolecular and Biomedical Science

olga.baron@ucd.ie

Research Challenge / Expertise Required: WE OFFER:
-Simple in vivo model organism – the fruit fly Drosophila melanogaster– for health research;
-Longevity assays – lifespan analysis in a month
-Vitality, mobility, fecundity, sleep, food consumption
-Nociception – response to noxious stimulus
WHAT WE ARE LOOKING FOR:
-Collaborators - interested to test their gene, toxin, drug, nutrient in vivo to investigate longevity, pain processing, seizure and neuronal or muscular health
-Collaborators that have computational or engineering skills to enhance apparatus for video assisted automated analysis of stereotypic behaviours in the fly – e.g. recognising seizures, grooming behaviour, jumps
GET YOUR DATA IN FEW WEEKS

Expected output: Preliminary data for grant application | Collaborative grant application | Joint PhD or MSc project |

"Modelling and manufacturing anthropomorphic phantoms for medical imaging assessment based on 3D printing"

Dr. Irene Hernandez Giron

School of Physics

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Research Challenge / Expertise Required: The quality control of medical imaging devices leans on using simple geometric test objects that do not reproduce the patient anatomy, morphometry, tissue texture or disease stage. There is a need of realistic anthropomorphic phantoms reproducing a wide range of patients' characteristics and disease stages to evaluate and optimize image quality closer to the clinic. Generating mathematical models of different anatomical parts and manufacturing them by 3d printing with materials mimicking the patient's attenuations can overcome these issues. We are looking for 3D printing experts, computer scientists (anatomical model generation), clinicians, medical physicists and radiographers (evaluation of phantoms and medical images).

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | I would like to establish a UCD network related to 3D printing in medical applications, in particular for medical imaging.

"Designing and Evaluating Nudges Using Language"

Dr. Vivek Nallur

School of Computer Science

vivek.nallur@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator who has expertise in designing and evaluating nudges, for efficacy and ethical alignment. Our goal is to design a personalized/adaptive nudging tool, that can help individuals make better decisions. Our current focus is on averting framing and loss-aversion bias, but we are open to any other bias that can be detected via text/natural language. We intend to do both, prepare data for a joint publication as well as use it as preliminary material for a grant application.

Expected output: Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Organised nanoscale architectures for biological regulation including surface property and shape"

Dr. Zengchun Xie

School of Chemistry

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Research Challenge / Expertise Required: To understand the role of distinct physical and chemical features of nanoparticles in their capacity to function, we have established a fully controlled process for the synthesis of nanoparticles with different properties (sizes, core materials, shapes and surface functionalization). Then in-depth characterization of nanoparticles for a variety of features such as size distribution, shape, surface charge, surface ligand density, optical properties as well as cellular localization was persormed. The goal of them is to address a variety of bio-nano interaction questions and towards targeted applications.

Expected output: Collaborative publication | Collaborative grant application |

"Looking for chemists to find inhibitors for a transcription factor involved in cancer progression"

Dr. Maria Prencipe

School of Biomolecular and Biomedical Science

maria.prencipe@ucd.ie

Research Challenge / Expertise Required: Over the past few years, I have focused on the Serum Response Factor (SRF) as a potential therapeutic target for hormone-driven cancers. We have shown that SRF is associated with prostate cancer development and progression in patients and that its inhibition reduces cancer cell survival through cell cycle arrest. However, we are lacking inhibitors which specifically target this protein. I am looking for expertise in medicinal chemistry or similar to design specific SRF inhibitors.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

"Investigation of the drivers of adaptation in the low oxygen environment during bacterial infection of cystic fibrosis lung"

Dr. Siobhán McClean

School of Biomolecular and Biomedical Science

siobhan.mcclean@ucd.ie

Research Challenge / Expertise Required: Chronic infections are the biggest issue for people with cystic fibrosis. We wish to understand the processes that bacteria undergo when they switch from acute to chronic infection.

Looking for researcher with expertise in bioinformatics to collaborate on an SFI-funded project examining the role of low oxygen in the adaptation of bacteria during infection in people with CF. Two researchers will perform bioinformatic analysis will need some training to get started and expert ongoing insight. We have collected a series of sequential bacterial isolates from patients with CF over time for NGS. Our goal is to (1) confirm clonality and (2) investigate evolution.

Expected output: Collaborative publication |

"Alternative animal models to further your research"

Dr. Niamh O'Sullivan

School of Biomolecular and Biomedical Science

niamh.osullivan@ucd.ie

Research Challenge / Expertise Required: Information on alternative models in disease research to find out more about the animal models already available in UCD and how they might further your research! For researchers who would like to study their gene / pathway / compound / mechanism of interested in an animal model but at a fraction of the time and cost of mammalian models.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Combinatoric rare disease gene mapping methodology"

Dr. Ricardo Segurado

School of Public Health, Physiotherapy and Sports Science

ricardo.segurado@ucd.ie

Research Challenge / Expertise Required: I am looking to collaborate with a mathematician or statistician with experience or interest in combinatorics to further develop a method for mapping rare disease genes (in humans primarily), validate the method in simulated and real data, and implement it in a form useful to clinical DNA sequencing services.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Finding the elusive counterparts to gravitational wave events"

Dr. Morgan Fraser

School of Physics

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Research Challenge / Expertise Required: In 2017, astronomers first identified a flash of light and a burst of gravitational waves, as the husks of two long dead stars spiraled into each other. This unique event shed light on stellar evolution, fundamental physics, and cosmology. Now, we seek to find more of these events, using upgraded gravitational wave detectors and wide field survey telescopes. This has proven a challenge, as the events we seek are faint and fade rapidly. To tackle this will require contributions from mathematics and statistics, engineering and physics.

Expected output: Collaborative grant application | Joint PhD or MSc project |

"Responsive Nanocomposite materials for Biomedical Applications"

Prof. Dermot Brougham

School of Chemistry

dermot.brougham@ucd.ie

Research Challenge / Expertise Required: In our group we make magnetic nanoparticles for MRI applications and printable magnetic nanoparticles embedded hydrogels as field responsive cell supports/drug delivery depots. Current challenges include;

purifying the particles sufficiently for them to be non-toxic when prepared at scale;

identifying partners for targeted (parenteral) MRI agent development;

assessing particle dispersion/ordering in the gels;

providing spatial control over magnetic fields during printing to generate order within the gels.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Identification and Quantification of Neurochemicals & Biomarkers"

Dr. Robert Johnson

School of Chemistry

robert.johnson@ucd.ie

Research Challenge / Expertise Required: We are developing a highly sensitive (pM to fM) sensing technology capable of identifying neurotransmitters and other small molecules and would be keen to work with interested parties that have potential biomarker targets for a proof of concept demonstration.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

"Advancing the clinical utility of Extracellular Vesicles"

Dr. Margaret Mc Gee

School of Biomolecular and Biomedical Science

margaret.mcgee@ucd.ie

Research Challenge / Expertise Required: Extracellular Vesicles (EVs) have emerged as a promising liquid biopsy and therapeutic carrier due to easy access in biofluids, stability, biocompatibility, and low immunogenicity. We have research programmes to investigate EV biomarkers in cancer and degenerative joint disease.

1. Current EV isolation strategies are not compatible with point-of-care clinical testing. We wish to explore the use of microfluidic platforms for EV isolation, characterization, production and design of EV-based therapies.

2.We also wish to investigate EV function in animal models of arthritis (bovine, equine) and reproductive biology, and in food biotechnology.

Expected output: Preliminary data for grant application | Collaborative grant application | Joint PhD or MSc project |

"Development and application of smart materials. Assessing the potential of such materials to bio and engineering based problems"

Dr. James Rice

School of Physics

james.rice@ucd.ie

Research Challenge / Expertise Required: The development of organic smart materials that are safe and sustainable offers opportunities in areas such as novel energy harvesting materials or making a better biomolecular detection technology. A challenge is to apply such materials in either or both of these areas through combining expertise in the School of Physics with those in Engineering or bio-science.

Expected output: Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Description of bionano interface in food and medical devices"

Dr. Vladimir Lobaskin

School of Physics

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Research Challenge / Expertise Required: We are studying the mechanisms of interaction of engineered materials with biological fluids and the characteristics determining biocompatibility and fouling of materials. We develop computational models to predict the biomolecular corona of the material and its overall biological activity. We are interested in experimental data on protein, fat, and sugar adsorption on various materials (e.g. metals, polymer, ceramics) at various conditions.

Expected output: Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Developing Phosphorus Compounds as Sustainable Non-metal Catalsyts"

Dr. Tom Hooper

School of Chemistry

tom.hooper@ucd.ie

Research Challenge / Expertise Required: Our aim is to develop reactive phosphorus species as catalysts for important reactions, circumventing the use of rare and expensive transition metals. As our research develops, expertise in scale up and processing may become needed. The phosphorus species may also have some interesting photochemical/photophysical properties which we would like to explore in more depth.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

“Meta-analysis of preexisting RNA-Seq datasets from Alzheimer's patients”

Dr. Marie-Victoire Guillot-Sestier

School of Medicine

marie-victoire.guillot-sestier@ucd.ie

Research Challenge / Expertise Required: The focus of my research is to elucidate sex differences in phenotype and function of immune cells in Alzheimer's disease. I am looking for an expert in bioinformatics to initiate a collaboration aimed at reusing/mining publicly available datasets from AD patients. Genes linked to inflammation, immune cell function differentially expressed with sex will be identified in the selected datasets. The next step would be to model sex-differential gene variation in vivo.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"To use commercially-available smart technologies to positively disrupt sedentary time physical inactivity among children and youth with physical disabilities"

Dr. Ross Neville

School of Public Health, Physiotherapy and Sports Science

ross.neville@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in the application of commercially-available smart technology (e.g., iPhone, Apple Watch) in research settings (e.g., collection of intensive longitudinal data via ecological momentary assessment) with the goal of informing practice (e.g., creating a data dashboard for healthcare practitioners). Our goal is to repurpose smart technology to link healthcare practitioners with parents of and children with disabilities to engage in objective monitoring and promotion of daily physical activity and to facilitate goal-setting to achieve daily physical activity recommendations. Note: we have phones, wearables and participants and have a project up and running....we just need more expertise!!!

Expected output: Preliminary data for grant application | Collaborative grant application | Joint PhD or MSc project |

"Food Waste at UCD: local solutions to improving food systems"

Dr. Sarah Browne

School of Public Health, Physiotherapy and Sports Science

sarah.browne1@ucd.ie

Research Challenge / Expertise Required: In 2023, we are undertaking a multi-component study mapping food waste practices on campus across a sample of settings. Like many institutional settings, unnecessary food waste is common, and with it the exit of energy, nutrition and resources. This idea proposes the development of local, food system solutions requiring expertise from biotechnology, nutritionists, food service staff and management, ecologists, microbiologists, horticulturalists and others.

Expected output: Collaborative grant application |

"Exploration of plant-microbiome resilience to ionizing radiation within the space life sciences"

Prof. Nicholas Brereton

School of Biology and Environmental Science

nicholas.brereton@ucd.ie

Research Challenge / Expertise Required: Researchers within the School of Biology and Environmental Sciences are developing a plant-microbiome growth system able to remediate common anthropogenic soil contaminants which are also prevalent in Martian regolith. The team is aiming to enable future research for LEO and Lunar Gateway, and seeks collaborators with specialties in ionising radiation to explore applied and theoretical interactions with complex biological systems.

Expected output: Preliminary data for grant application | Collaborative grant application |

"Understanding the Dynamic Seafloor for Sustainable Management and Development"

Dr. Mark Coughlan

School of Earth Sciences

mark.coughlan@ucd.ie

Research Challenge / Expertise Required: Further details: The interaction of marine hydrodynamics with the physical seafloor can cause significant changes over time. These changes have implications for habitats, the siting of engineering infrastructure (e.g. electrical cables), mitigating the effects of climate change (e.g. coastal erosion) and archeological conservation (e.g. shipwrecks). We are looking to form a cross- and multi-disciplinary working group to collaborate on understanding these physical processes and their implications. Our goal is to build on existing capacity within UCD in terms of expertise and infrastructure, and to secure external funding for impactful research of societal value.

Expected output: Collaborative grant application | Form a working group for information, data and expertise sharing

"Computational methodology to correlate the nanostructures properties and bio-interactions"

Dr. Wei Zhang

School of Chemistry

wei.zhang@cbni.ucd.ie

Research Challenge / Expertise Required: Bio-nanoscale interactions are greatly influenced by the properties (e.g. surface, composition and so on) of nanostructures. How to link this two together and set up a model for the potential interactions prediction is an intriguing question in the bionano-chemistry field.

Expected output: Collaborative publication |

"Targeting RNA-based therapies to vascular lesions in atherosclerosis"

Dr. Eoin Brennan

School of Medicine

eoin.brennan@ucd.ie

Research Challenge / Expertise Required: Atherosclerotic cardiovascular disease (ASCVD) is a leading cause of death and disability worldwide. ASCVD is characterized by a chronic inflammatory build-up, driven largely by low-density lipoprotein cholesterol (LDL-C) accumulation within the artery wall. We have identified the let-7 miRNA family as master regulators of pro-inflammatory pathways in ASCVD. We hypothesize that restoration of let-7 levels in atherosclerotic vascular lesions will suppress key inflammatory pathways. Targeting miRNA-based therapies to vascular lesions will likely reduce the risk of adverse events associated with systemic administration. Thus, we are seeking expertise in nanomedicines/drug-delivery strategies to target miRNA therapies to vascular lesions.

Expected output: Preliminary data for grant application | Collaborative publication |

"To determine if mucin glycoproteins can act as biological signalling molecules"

Dr. Carol Aherne

School of Medicine

carol.aherne@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in mucins, glycobiology or glycosylation to help determine if mucin glycoproteins have a direct role in signalling to intestinal cells.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

"To improve type 2 diabetes prevention engagement in women with gestational diabetes"

Prof. Sharleen O'Reilly

School of Agriculture and Food Science

sharleen.oreilly@ucd.ie

Research Challenge / Expertise Required: We are looking to collaborate with experts in health economics, point of care testing, general practice and technology to improve the user experience in general practice software. The goal is to develop a funding application and publish collaborative work.

Expected output: Collaborative grant application |

"Eco-Engineering coastal protection approcahes in mitigating extreme climatic events"

Dr. Md Salauddin

School of Civil Engineering

md.salauddin@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in marine biology to collaborate on a project focussed on the perforamance of eco-engineered coastal protections in mitigating extreme climatic events in nearshore areas.

Expected output: Collaborative grant application |

"Exploring the role of gap junctions in epilepsy"

Dr. Áine Byrne

School of Mathematics and Statistics

aine.byrne@ucd.ie

Research Challenge / Expertise Required: We are looking for an experimental collaborator with expertise in synaptic connectivity (electrical and chemical) to assist in the development of a mathematical model to study epileptic seizures, with a particular focus on gap junctions. We require input from a neuroscientist/biologists on the biological realism of the model. We would also like to establish a more longer term collaboration whereby we use the model to make predictions which can be tested experimentally by the experimental collaborator(s).

Expected output: Collaborative publication |

"Models to understand pain mechanisms and response to exercise / physical activity"

Dr. Michelle Hall

School of Medicine

michelle.hall@ucd.ie

Research Challenge / Expertise Required: Clinical scientist with special interest in chronic musculoskeletal pain seeks collaborations with biologists with expertise in animal models to investigate genetics variants and exercise / physical activity.

WE OFFER:

-Access to big data sets of clinical data on people with chronic hip and knee pain

-Whole genome sequencing data

-Lifestyle factors including physical activity, sedentary behaviour, sleep

WHAT WE ARE LOOKING FOR:

-Collaborators interested in investigating if selected genes associated with lifestyle factors (sedentary behaviour, physical activity, sedentary behaviour)

Expected output: Collaborative publication | Collaborative grant application |

"To establish anti-cancer and anti-viral efficacy of human Interferon-gamma in human cell lines"

Dr. Marina Rubini

School of Chemistry

marina.rubini@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in Infection Biology to test the anti-cancer and anti-viral efficacy of our engineered human Interferon-gamma variants.

Expected output: Collaborative publication | Collaborative grant application |

"Expertise in innovative statistical and machine learning methods for data-driven research to establish new collaborations"

Dr. Michael Fop

School of Mathematics and Statistics

michael.fop@ucd.ie

Research Challenge / Expertise Required: My primary research focus is on developing innovative statistical and machine learning methods for analyzing complex and high-dimensional data. Specifically, I am interested in developing models that can detect hidden patterns and describe complex dependencies within the data. I am particularly passionate about exploring new fields and scientific problems where data-driven research demands the development of novel data analysis methods. I am attending the event with the intent of establishing new collaborations with researchers in other scientific fields.

Expected output: Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"Co-designing an educational resource to improve interprofessional collaboration among undergraduate students"

Dr. Lisa Rogers

School of Nursing, Midwifery and Health Systems

lisa.rogers@ucd.ie

Research Challenge / Expertise Required: While UCD's undergraduate programmes in health and social care provide students with an understanding of care processes relevant to each discipline (e.g. nursing, medicine, physiotherapy), students lack opportunities to interact interprofessionally. This leads our graduates to enter the workforce unprepared for the teamwork they will inevitably face as students are educated to function independently within discipline-specific silos. To improve collaboration, this project aims to create more inclusive undergraduate curricula by facilitating opportunities for interprofessional education using a game-based approach. This project will create an online escape room to ensure students build competencies in interprofessional working (e.g. role clarity, respect, trust).

Expected output: Preliminary data for grant application |

"Exploring novel therapeutic strategies for neurodegenerative diseases"

Dr. Derek Costello

School of Biomolecular and Biomedical Science

derek.costello@ucd.ie

Research Challenge / Expertise Required: My research explores the mechanisms underlying neurodegenerative diseases, such as Alzheimer's disease and ageing, along with disorders that disrupt brain functioning (eg epilepsy, infection). In particular our work is focused on identifying new molecular targets for therapeutic intervention, along with exploring novel pharmacological agents as therapeutic strategies. We are interested in developing collaborations in which we may explore novel in vivo and ex vivo models / model organisms as investigative platforms for screening of novel drugs. In addition, we hope to validate tools for identification of cellular pathways which may indicate vulnerability to disease, or offer therapeutic potential.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Analysis of viral gene particles in terms of quality, purity and potency"

Prof. Susan McDonnell

School of Chemical and Bioprocess Engineering

susan.mcdonnell@ucd.ie

Research Challenge / Expertise Required: Our group is involved in the upstream manufacture of AAV gene therapies. We have developed a production process in HEK293 but are looking for some collaboration in the analysis of viral particles in terms of quality (empty/full) and potency

Expected output: Preliminary data for grant application | Collaborative grant application |

"To unlock insights and advancements through AI modelling on biological/clinical datasets"

Dr. Polat Goktas

School of Computer Science

polat.goktas@ucd.ie

Research Challenge / Expertise Required: I am a Marie-Curie Research Fellow at the School of Computer Science, and Centre for Applied Data Analytics Research (CeADAR) at University College Dublin, with a research focus on the development of deep learning and machine learning models to address biological problems using the explainable artificial intelligence (XAI) approach. Specifically, I am interested in developing techniques for label-free, high-throughput classification and detection of cellular information from microscopy images without staining procedures. I am thrilled to be a part of UCD's STEM Research Day and am eager to use this opportunity to establish potential collaborations in developing enthusiastic artificial intelligence frameworks. This platform will also enable me to expand my professional network and explore funding opportunities. For further inquiries or collaboration opportunities, please reach out to me at polat.goktas@ucd.ie.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

"Difficulties in the quantification of Biomarker expression using RNAscope V2 Assay and Digital Image Analysis software QuPath"

Miss Caoimbhe Burke

School of Biomolecular and Biomedical Science

caoimbhe.burke@ucdconnect.ie

Research Challenge / Expertise Required: Breast cancer(BC) is the most common cancer diagnosed amongst women. Clinical parameters used to predict progression risk often are not sufficient. RNA in situ hybridisation(ISH) can offer digital pathology-based quantification of prognostic gene expression within histological samples. We have used ISH to investigate the spatial distribution of transcripts within BC tissue sections. We have established staining and digital image analysis workflows for the quantification of dots (transcripts) per cell. Issues arise however when multiple dots appear together, as the total transcripts within a "cluster" is difficult to define. We are currently exploring alternate image analysis algorithms to improve cluster quantification.

Expected output: Collaborative publication |

"To valorize a food side stream through fermentation, that could mitigate neurodegenerative conditions"

Dr. Heleena moni Bottu

School of Agriculture and Food Science

heleena.bottu@ucd.ie

Research Challenge / Expertise Required: I am looking for a collaborator with expertise in the extraction of bioactive from fermented foods for both food and biomedical applications on a project focused on screening fermented food extracts by establishing 3D cells as an innovative scaffold-based technique by implementing the translational value as the future for screening dietary products.

The aim is to bring added value to underutilized food resources through fermentation as a sustainable process to maximize brain health and cognitive conditions. The study will perform the extractions, and preliminary screenings and have publication as a basis to apply for joint funding to perform targeted studies.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

“Optimization methods for neural networks' training”

Dr. Marco Viola

School of Mathematics and Statistics

marco.viola@ucd.ie

Research Challenge / Expertise Required: I recently joined the School of Maths and Stats and my main field of expertise is numerical optimization. In the last few years, I have started studying stochastic first- and second-order optimization methods, which are of great use in the training of machine learning / deep learning models. I am looking for an expert/enthusiast in deep learning who might be interested in exploring new methos for the training of DL models, aiming at reducing the computational burden of the training phase and/or at improving the representation capabilities.

Expected output: Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Collaborations in fluid mechanics and turbulence"

Dr. Miguel Bustamante

School of Mathematics and Statistics

miguel.bustamante@ucd.ie

Research Challenge / Expertise Required: I am bidding to organise a large EUROMECH conference: the European Fluid Dynamics Conference, to take place in UCD in August 2025, with over 1,000 expected delegates. The decision is imminent (12 April) and we are very likely to be successful. I want to create a hub in UCD to gather the research efforts in fluid mechanics, so as to maximise UCD's visibility in this important research area. Important topics that could become minisymposia and where we have identified potential cross-fertilisation between UCD schools, include: Carbon capture and its geological storage; Applications to health sciences via modelling and control of contamination of air flows; Wind turbines; Water waves; Bubbles and multiphase flows; Education: experimental fluid mechanics; Machine learning methods for fluid modelling.

These topics are important on their own and we provide expertise in mathematical modelling, analytical calculations and numerical simulations.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project | Minisymposia organisation at a large UCD conference

"Standardised design and planning processes enabling the adoption of modern methods of construction in affordable housing"

Dr. Samar Raffoul

School of Civil Engineering

samar.raffoul@ucd.ie

Research Challenge / Expertise Required: The availability and affordability of adequate housing is a major economic and social concern in Ireland and globally. The digitalisation of construction, through modern methods of construction (MMC) can potentially address these issues, by allowing houses to be built quickly offsite, at lower cost and with high sustainability credentials. Nevertheless, several issues limit the speed of MMC adoption, including limitations in practical design guidelines as well as navigating the planning process. One way to streamline MMC to build affordable housing could be by providing standardised house types (based on optimised designs and sustainability criteria) or a qualitative assessment procedure allowing quicker planning processes.

Expected output: Collaborative grant application |

"Effects of microplastics on cytotoxicity and viral infections"

Dr. Tristan Russell

School of Veterinary Medicine

tristan.russell@ucd.ie

Research Challenge / Expertise Required: We are interested in collaborating with experts in the field of microplastics using a One Health approach to begin to tackle the impact of an environmental issue on human and animal health. Complementing our expertise in cell culture and virology, we would measure the cytotoxicity of different microplastics and determine their effects on viral infectivity. Firstly, we would aim to publish the findings of our collaboration. Next, we would aim to apply for additional funding to measure the accumulation of microplastics in organs and tissues, then determine how this effects susceptibility to viral infections.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application |

"We are researching the effects of manual therapy in connective tissue(Fascia) using different methods, ultrasound, biomarkers and muscular tone devices. We would also like to establish what is the necessary pressure required to see a change in the myofasc"

Ms. Maria Jose Gomez Sanchez

School of Veterinary Medicine

maria.gomez-sanchez@ucd.ie

Research Challenge / Expertise Required: We know the benefits of physiotherapy and manual therapy can be determining for the recovery of neurological patients and orthopedic conditions. We also know it helps with pain perception and proprioceptive awareness. We now know the essential role of fascia but we are still lacking on objective tools to measure its pathologies and its recovery journey. We have a team of pathologists, surgeons, medics, DI specialists and physio working together to be ablet o understand deeper the role and the potential of this continous web full of "well being" potential.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint Stage 4 Project | Joint PhD or MSc project |

"Explore applications of Symmetric Nonnegative Matrix Trifactorization in interpretability of symmetric non-negative data"

Dr. Helena Smigoc

School of Mathematics and Statistics

helena.smigoc@ucd.ie

Research Challenge / Expertise Required: In Symmetric Nonnegative Matrix Trifactorization an entry-wise nonnegative symmetric matrix is approximated by a matrix of the form WSW^T, where W and S are nonnegative, and the number of columns in W can be chosen. Here, W identifies highly correlated items in the data set (communities), and S explains their interactions. We are looking for experts with datasets that are suitable for analysis with this factorisation, and for experts that would help develop algorithms that can take into account potential structure in the dataset.

Expected output: Collaborative publication |

"Engineering proteins/enzymes for non-natural reactions"

Dr. Elaine O Reilly

School of Chemistry

elaine.oreilly@ucd.ie

Research Challenge / Expertise Required: Our group are interested in repurposing proteins to carry out non-natural reactions and are keen to collaborate with those with expertise in molecular biology and protein engineering. We are also interested in talking to those with expertise in Human Serum Albumin and other binding proteins.

Expected output: Preliminary data for grant application | Collaborative publication | Collaborative grant application | Joint PhD or MSc project |

"To develop an automated method to analyse innate immune cell interactions/dynamics in live zebrafish larvae"

Dr. Darrell Andrews

School of Medicine

darrell.andrews@ucd.ie

Research Challenge / Expertise Required: We are looking for a collaborator with expertise in imaging and image analysis to collaborate on a project focused on investigating innate immune cell interactions during tissue injury and repair in zebrafish. We have expertise in a number of zebrafish models suited to screening approaches, including a model of injury and repair which we have developed using transgenic zebrafish lines with fluorescently tagged immune cells. Our aim is to use this model to demonstrate proof of principal and apply for additional funding to support our collaborative work.

Expected output: Preliminary data for grant application | Collaborative grant application |

"Statistical network analysis for biological networks"

Dr. Riccardo Rastelli

School of Mathematics and Statistics

riccardo.rastelli@ucd.ie

Research Challenge / Expertise Required: I am interested in utilising statistical network analysis methods to analyse various types of biological network data. These data can include microbiome data (e.g. abundance of microorganisms), other species co-occurrence networks, food webs, and potentially proteomics or metabolomics data. My expertise is in theoretical and computational network science; I am looking for collaborators with more applied expertise on any of the application areas above

Expected output: Collaborative publication | Collaboration |