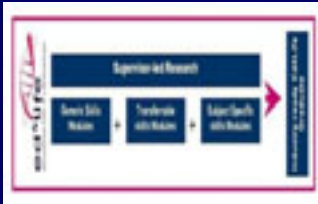


Ed4Life Life Sciences Structured PhD Newsletter

The next generation of Postgraduate Research and Training



ED4LIFE POINTS OF INTEREST:

- The basis a structured PhD like the traditional PhD is the advancement of knowledge through original research
- As part of a structured PhD a number of generic and subject specific skills modules are completed
- This enables our graduates to enter a wide variety of different career paths
- The Ed4Life PhD operates over 48 months full-time or 96 months part-time
- Leads to a Level 10 award of Doctor of Philosophiae
- Candidates must possess a primary degree, minimum 2.1, in the Life Sciences
- The Personal Development Plan or PDP serves to help students become more effective, independent, and confident learners

2012 Ed4Life Induction



Funded under the Programme for Research in Third Level Institutes (PRTLII) Cycle V, the Ed4Life structured PhD offering is fast becoming established as an innovative leader in the area of PhD education and training for Life Science postgraduates.

The Ed4Life programme has since its launch on the 26th September, 2011 gone from strength to strength with the latest influx of 'Ed4Lifers' commencing in September 2012. This collaborative programme between CIT, the Alimentary Pharmabiotic Centre based in UCC, and Moore-

park Dairy Research Centre has worked in conjunction with Industry-based stakeholders to develop over the past year a suite of dedicated generic, and transferable skills modules aimed at supporting and

developing the skills base required by the early stage researcher at the beginning of their PhD journey. Add to these the huge range of subject specific modules on offer and it appears the programme aim of a flexible, employer-ready graduate will be realised with the graduation of the first Ed4Life graduates expected in 2014.

Ed4Life generic and transferable skills modules undertaken by 2012's first year students include modules on Personal Effectiveness, Research Methods, and Teambuilding & Communication. Topics are delivered in workshop format by presenters based in academia, research, and industry and include health and safety training, effective writing skills, teamwork, leadership, networking, and the presentation toolkit. Workshops for the Personal Effectiveness module commenced on the 31st October and those belong to the Research Methods module are scheduled for delivery from January 14th - 18th 2013.

The diverse range of accredited subject specific skills modules on offer in the second and third year of the Ed4Life programme via CIT



Communications Workshop with Ita Gubbins of GE Healthcare and JMB member.

and UCC and campuses cover areas of the life sciences as well as industry and business areas with modules on cancer biology, animal breeding, microbiology, and biostatistics delivered alongside modules on entrepreneurship, marketing, negotiation, and strategic agribusiness management amongst others. Choices for this year's 2nd Year Ed4Life students include a module in Effective Teaching delivered in semester one. In semester two, modules in biostatics, bioinformatics, entrepreneurship, and agribusiness supply chains are on offer.

Further information on the Ed4Life PhD programme and the generic, transferable, and subject-specific skills modules can be found at

www.cit.ie/ed4life

Ed4Life *The Cutting Edge*



Ed4Life researchers and their supervisors conduct cutting edge research in various areas of the Life Sciences in research laboratories scattered throughout the partner facilities however this isn't where cutting edge ends as with an Ed4Life PhD, its only the beginning...

CIT has developed a dedicated online skills portfolio builder for Ed4Life students using Pebblepad software. An e-portfolio is a personal, digital learning space that supports the process of learning and the product of learning, e.g. a conference paper.

The e-portfolio each student creates becomes a record of the skills and experience they have gained over the course of their Ed4Life journey. This information is stored in a secure but accessible website from where items of the e-portfolio can be shared with prospective employers, teachers or anyone else.

Ed4Life students collect a wide range of authentic evidence in digital form, which includes not only written text but also images, audio and video. The opportunity also exists for the learner's reflective practice to become more sophisticated as their graduate capabilities or employability skills increase throughout their graduate studies. In addition many of the Ed4Life modules are assessed via the e-portfolio making its creation, development, and the generic skills it supports an integral activity of the Ed4Life PhD. For more information contact Dr Siobhan O' Sullivan our Pebblepad training provider. E: Siobhan.OSullivan@cit.ie



Ed4Life Students and Supervisors

Ed4Life 2nd Year PhD Student - SITI NUR TAHIRAH BT JA'AFAR Supervisor - Prof. Dave Sheehan, UCC



'The structured PhD programme is designed to decrease completion time and increase employability'

Tahirah is pursuing her Ed4Life PhD through UCC's Department of Biochemistry where she is supervised by Professor Dave Sheehan. She is the recipient of an Academic Training Scheme sponsored by the Ministry of Higher Education, Malaysia to complete her PhD in Ireland.

Tahirah's research focuses on the potential of proteomics and other biochemical approaches to detect deleterious effects of new classes of environmental pollutants such as endocrine disruptors, nanomaterials and pharmaceuticals on the popular sentinel species, *Mytilus edulis*, also known as the Blue Mussel.

The Blue Mussels used in this project are harvested from a previously investigated pair of sites in Cork Harbour, one of which is clean (reference site) and the other moderately polluted (test site). Mussels sampled

from the reference site are exposed in holding tanks to a concentration range in each case of a model endocrine disruptor (bis-phenol A), a nanomaterial (approx. 10 nm copper) kindly donated by collaborators based in the Tyndall Institute, and a pharmaceutical (diclofenac). Gills and digestive glands are dissected and used as a source of protein for analysis.

Extracts are analysed for protein carbonylation, oxidation of protein thiols, total oxygen scavenging ability, lipid peroxides, effects on activity levels of important metabolic enzymes, and also for the effects on antioxidant molecules and enzymes.



Ed4Life Supervisor - Prof. David Sheehan

Prof. Sheehan currently teaches Biochemistry and courses at Science III and IV Level with an emphasis on Proteins (especially enzymes), their structure and study in UCC. He also has a strong interest in biophysical methods for studying proteins.



**Ed4Life Supervisor
Prof. Dave Sheehan,
UCC**

Prof. Sheehan is currently a committee member of the British Biophysical Society and supervises PhD students funded by

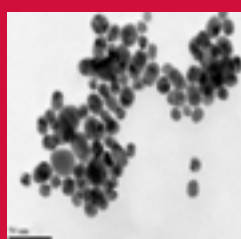
Irish Research Council for Science, Engineering and Technology (IRCSET) and the Higher Education Authority (HEA).

Current Research Studies include :

Glutathione transferases (GSTs) which are important in removing foreign and potentially toxic chemicals (xenobiotics) from cells by catalysing conjugation to glutathione and play a major role in

non-catalytic binding of endogenous and xenobiotic ligands. As such they are of major pharmacological and environmental importance.

Prof. Sheehan's group has pioneered the study of these enzymes from fungi in order to shed light on the evolution



Yarrowia lipolytica

of the main GST classes. They have now purified GSTs from a range of species and this has revealed that fungal enzymes are structurally related to the Theta class. Moreover, they have purified one of the largest GSTs ever isolated from the *non-Saccharomyces* yeast, *Yarrowia lipolytica*, which is a component of the elongation system of protein biosynthesis EF1By.



Mytilus edulis the blue mussel

A second activity has focused on GSTs of *Mytilus edulis*, a popular bio-

indicator organism, with a view to their potential use as indices of exposure to chemical pollution.

Their investigations have been extended by biochemically characterising mussel GSTs, assessing levels of other antioxidant enzymes and heat shock proteins in response to pollution as well as investigating natural biological variation in antioxidant enzyme levels.

If you are interested in pursuing an Ed4Life PhD with Prof. Dave Sheehan or a potential collaborator he can be contacted at the following address:

Proteomic Research Laboratory, Department of Biochemistry, University College Cork, Lee Maltings, Prospect Row, Mardyke, Cork.

E: d.sheehan@ucc.ie

Ed4Life Supervisor - Dr Aidan Coffey, CIT

Dr Aidan Coffey is a Senior Lecturer at the Department of Biological Sciences and a Principal Investigator at Cork Institute of Technology's Centre for Research in Advanced Therapeutic Engineering (CREATE).

Dr Coffey's research interests are in the area of Microbiology and in particular the biocontrol of pathogenic microorganisms in the context of infectious disease and food. To date, he has been the author of over 100 peer-reviewed research papers and book chapters, and he is also the co-author on two patents.

To date, he has been the supervisor of twelve graduated PhD students and ten graduated

MSc students.

Dr Coffey's research award allocations total in excess of €3.5 million from varied sources of funding which include Science Foundation Ireland (SFI), Enterprise Ireland (EI), Department of Agriculture (FIRM), Teagasc, and the Irish Research Council for Science Engineering and Technology (IRCSET).

He has also been involved securing capital investment totaling more than €4.5 million (Source: Higher Education Authority).

Dr Coffey's research has been featured in The Sunday Independent, The Irish Times, Evening Echo, The Irish Examiner, Irish Independent and on Sky News.

If you are interested in pursuing a PhD or MSc with Dr Coffey or are a potential collaborator, he can be contacted at the:

Department of Biological Science,
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Ed4Life
Supervisor
Dr Aidan
Coffey

'Ed4Life PIs are highly skilled world class researchers and supervisors'

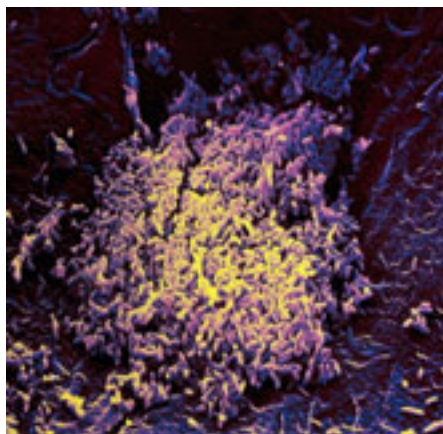
Ed4Life 2nd Year PhD Student - Aidan Casey



Aidan Casey is based at the Teagasc Moorepark Food Research Centre at Fermoy, Co. Cork and is now in the second year of his Ed4Life PhD. Prior to commencing his doctorate in UCC, from 2005-2010, Aidan completed a BSc (Hons) degree in Biochemistry, and later a MSc degree in Bioinformatics and Systems Biology.

His research focuses on the pathogenic bacterium *Listeria monocytogenes* and in particular its role in the contamination of 'ready-to-eat' foods.

Listeria monocytogenes is a dangerous disease-causing pathogen, which is capable of growth at refrigeration temperature. Its ubiquity means that foods which are stored in the refrigerator can harbour this bacterium. However it utilises explosive polymerization of actin filaments known as comet tails or actin rockets to move within eukaryotic cells.



SEM of *L. monocytogenes* x 925 (Getty Images)

Listeriosis is the illness that results from infection with *L. Monocytogenes* which is commonly present in the environment and food. Most people who are otherwise healthy and not pregnant may tolerate exposure to quite high levels of the bacterium in their food. The organism is important because infection in pregnancy is associated with a risk of severe infection of the foetus or newborn infant that may result in death. Those suffering a pre-existing illness can also be exceptionally vulnerable to *L. monocytogenes*.

Common sources of listeriosis are unpasteurised milk and cheeses and processed foods that become contaminated after processing, such as lunch meats. Thorough cooking and pasteurisation kills *L. monocytogenes*.

Aidan's work is divided into several different approaches, including development phage-based products to be used as detergents against *Listeria monocytogenes* in food-processing environments, and in the identification of a possible genetic basis for the ability of the bacteria to persist in an environment for extended periods of time.

Persistence a phenomenon not currently well understood is defined as 'the ability of an organism to remain in a particular setting/environment for a prolonged period of time after it has been introduced'. A strain of the bacteria can only be identified as a persister through lengthy sampling trials, and for this reason, Aidan's research will aim to develop a "rapid sampling test" capable of identifying persisters based on underlying phenotypic and genotypic traits.



Ed4Life 2nd Year PhD Student - Peter Skuse

Peter Skuse's Ed4Life PhD is a joint venture between UCC and Teagasc Moorepark in Fermoy and he is just entering the second year of his Ed4Life PhD.

His research work is conducted for the most part at the food biosciences research centre in Moorepark. Peter completed a BSc in Microbiology in UCC which he graduated from in 2011.

His research focuses on whey proteins and their impact on gut microbiota, and relative association with obesity. This involves generating fractions of the whey proteins of interest, and utilising these fractions as part of an in vitro assay to screen for bioactives. The ultimate goal of this will be to determine the effects of these bioactives on the composition of the gut microbiota in vivo.

Bioactive molecules are components of food that possess biological activity in addition to having a nutritional value. They are naturally occurring

plant and animal products with a variety of physiological functions. They are known to play a role in growth and development, as well as reduce the risk of disease.

Food bioactives, the bioactivity of different foods, and the methods of delivery of bioactive compounds are becoming increasingly important areas of food research.

Food fractions with identified bioactives that have proven health benefits can be incorporated into protective foods, nutraceuticals, and supplements.

To do this separation technologies are in development which will lead to the separation of bioactives for their incorporation into foods that will then contain high levels of bioactives with nutritional and health-giving properties.



Diagrammatic representation of the GI tract



Ed4Life supervisor Dr Paul Cotter

Ed4Life Supervisor - Dr Paul Cotter

Dr Paul Cotter is a principal research officer with Teagasc Food Research Centre and manager of Teagasc's 454 GS-FLX Sequencing platform. He is also a principal investigator with the Alimentary Probiotic Centre (APC) and Cork Bacteriocin Group. He has lectured in both CIT and UCC and graduated from UCC with a BSc and PhD in Microbiology.

Dr. Cotter has numerous accolades under his belt with the latest being the 2012 Teagasc Excellence in Research Award. In 2010, he was named APC Scientist of the Year and won in 2008 the SfAM W. H. Pierce Award. In 2007, he was named a joint ESCMID-FEMS Research Fellow and ESCMID Research Fellow, appointed to the Faculty of 1000 (Biology) in 2006, and winner of the Beckman Scholarship (UCC) in 1996.

Dr Cotter's research focuses on the microbiology of food (including beneficial, spoilage, and pathogenic microbes) and the gastrointestinal tract (using state-of-the-art DNA-based approaches to examine these microbes, with a view to maintaining/establishing a healthy gut flora through dietary interventions).

He is also experienced in the investigation of food-grade anti-microbial peptides ('bacteriocins'), which can be employed to enhance food safety and improve human and animal health, and in research of stress resistance and virulence factors employed by health-benefiting as well as disease-causing bacteria.

Dr Cotter has been the recipient of €3 million in funding from the Science Foundation Ireland, Enterprise Ireland, the Dept. of Agriculture, Fisheries and Food, the Health Research Board, the Irish Research Council for Science, Engineering and Technology, and the Teagasc Vision Programme.

If you are interested in pursuing a PhD or MSc with Dr Cotter or are a potential collaborator, he can be contacted at:

Teagasc Food Research Centre,
Moorepark,
Fermoy,
Co. Cork.

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Section of the GI tract showing microbes in situ



Why Choose an Ed4Life PhD?

Karen McCarthy one of our 2nd Year Ed4Life PhD Students explains the benefits...

I am a PhD student in the Department of Microbiology, UCC, and I am just entering the 2nd year of my research under the supervision of Prof. Michael Prentice.

My research work focuses predominantly on the topic of micro-compartments which are miniature protein organelles present in various species of bacteria, including *E. coli*. In particular, I am concentrating on the area of probiotic bacteria, and the functionality of their

micro-compartments.

Having completed my undergraduate studies in UCC, I decided I would like to pursue postgraduate studies. I had explored other universities as a post-graduate option, but when the opportunity arose for me to continue my studies in UCC, I happily accepted. I am also a research member of the Alimentary Pharmabiotic Centre, which is one of the top probiotic research units globally. As such, I am delighted to have access to world-class researchers and facilities.

Being a part of the Ed4Life programme has provided me with great opportunities to interact with people from varying disciplines, and to exchange ideas and advice. Beginning a PhD is quite a daunting experience, but being surrounded by other people also going through the process makes you feel more supported. The modules themselves have been quite beneficial, particularly the interactions with industry professionals. It has also been great to learn new IT techniques and methods of presenting and communicating my research work.



Dr Hugh McGlynn
Head of School of Science & Informatics

The Ed4Life Team

If you would like further information on the Ed4Life Structured PhD, the partner institutes, or our world-class PIs and their areas of expertise check out the Ed4Life website for further information and contact details: www.cit.ie/ed4life



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