

# Faculty of Science and Engineering



UNIVERSITY OF  
**LIMERICK**  
OLLSCOIL LUIMNIGH

## Current Research Projects

WEB: [WWW.UL.IE/SCIENG](http://WWW.UL.IE/SCIENG)

EMAIL: [SCIENG@UL.IE](mailto:SCIENG@UL.IE)

# Welcome



UNIVERSITY OF  
**LIMERICK**  
OLLSCOIL LUIMNIGH

The mission of the Faculty of Science and Engineering is to be a distinctive, national hub for innovative education, scholarship and integrated research in science and engineering. We offer a range of undergraduate degree programmes in Computing, Design, Engineering, Mathematics and Science and taught and research postgraduate programmes at Graduate Diploma, Masters and PhD levels.

The Faculty has a strong record of accomplishment in combining research excellence and applications to meet industrial and societal needs. Examples of the type of work that we perform are listed on our research web pages. We host two national research centres in pharmaceutical materials and software and three national technology centres in composite materials, pharmaceutical processing and dairy processing.

I would like to encourage you to explore the exciting range of education and research programmes offered by the Faculty.

Professor Kenneth Stanton  
Dean, Faculty of Science & Engineering



# Table of Contents

<b>Research Institutes &amp; Centres</b>	<b>1</b>
Bernal Institute	1
Research Centres	2
<b>Department of Computer Science &amp; Information Systems</b>	<b>3</b>
Research Projects	4
<b>Department of Electronic &amp; Computer Engineering</b>	<b>9</b>
Research Projects	10
<b>Department of Mathematics &amp; Statistics</b>	<b>12</b>
Research Projects	13
<b>School of Architecture and Product Design</b>	<b>16</b>
Research Projects	17
<b>School of Engineering</b>	<b>18</b>
Research Projects	19
<b>Department of Biological Sciences</b>	<b>25</b>
Research Projects	26
<b>Department of Chemical Sciences</b>	<b>28</b>
Research Projects	29
<b>Department of Physics</b>	<b>31</b>
Research Projects	32
<b>Contact Us</b>	<b>33</b>

# Research Institutes & Centres

## Bernal Institute

The Bernal Institute hosts a multidisciplinary team of world-leading materials scientists and engineers at UL. Bernal represents a €100m+ investment in world-class characterisation, modelling and manufacturing facilities concentrated in 20,000m of high quality research space.

Bernal research focuses on the synthesis (making), characterisation (measuring) and design (inventing) of nano, meso and macro structured materials.

Our Vision is to become the leading international research institute for the scientific design and manufacture of structured materials to meet global challenges, particularly in the areas of health, energy and the environment.

Our Mission is to develop disruptive technologies related to health, energy and environment that will create a legacy of scientific achievement in structured materials research that benefits future generations.

<https://ul.ie/bernal>

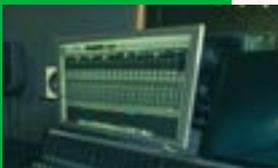


The Faculty of Science & Engineering at University of Limerick is host to a number of world-class Research Centres and units including national externally-funded research centres.

# Research Centres



**DPTC - Dairy Processing Technology Centre**



**LERO - The Irish Software Research Centre**



**MACSI - Mathematics Applications Consortium for Science and Industry**



**PMTC - Pharmaceutical Manufacturing Technology Centre**



**SSPC - The Research Ireland Centre for Pharmaceuticals**



# Department of Computer Science & Information Systems

---

## About

The Computer Science and Information Systems (CSIS) Department is dedicated to the advancement of knowledge in computing. Its teaching and research activities focus on a wide variety of computing disciplines including traditional topics like Software Engineering, and Computer Science but also state-of-the art topics like Bio-Inspired Intelligent Systems, and Artificial Intelligence and Machine Learning. It takes a wider view of computing in considering Human-Centred Computing, Music Technology, Digital Arts, and Games Development. It is home to the Irish Software Research Centre (Lero), a Research Centre focusing on the efficient, effective development of software systems for a better world.

## More info

<https://www.ul.ie/scieng/department-computer-science-and-information-systems>

# Current Research Projects

Department of  
Computer Science &  
Information Systems

## Research Theme Title

## Supervisor 1

## Supervisor 2

Language Digitisation for minoritised and indigenous languages

[Tabea De Wille](#)

Automated keyboard development for minoritised and indigenous languages

[Tabea De Wille](#)

Digital ascent and a truly multilingual web

[Tabea De Wille](#)

What is the true impact of generative AI on software engineer/programmer productivity?

[John Noll](#)

What motivates software engineers in Asia, Africa, and other parts of the "global south."

[John Noll](#)

How does hybrid working/working from home affect software developer productivity?

[John Noll](#)

Research Theme Title	Supervisor 1	Supervisor 2
What agile development practices actually improve project success?	<a href="#"><u>John Noll</u></a>	
Software Sustainability by Design	<a href="#"><u>Colin C Venter</u></a>	
AI-Driven Architectural Recovery and Reconstruction	<a href="#"><u>Colin C Venter</u></a>	
Machine Learning for Advanced Beam Optics Optimisation in High Energy Physics (HEP@CERN)	<a href="#"><u>Colin C Venter</u></a>	
Digital Entanglement in Distributed Web Services	<a href="#"><u>Colin C Venter</u></a>	
Green Large Language Models	<a href="#"><u>Colin C Venter</u></a>	
Performance Optimization and Semantic Convention of Large Language Models	<a href="#"><u>Abdul Razaq</u></a>	
Quantum Software Architecture	<a href="#"><u>Abdul Razaq</u></a>	
Software Architecture Modernization using Large Language Models	<a href="#"><u>Abdul Razaq</u></a>	

Research Theme Title	Supervisor 1	Supervisor 2
BWork-Life Balance: Controlling Developers' Productivity with Better Developer Experience	<u>Abdul Razzaq</u>	
AI Code Generation and Conversion	<u>Chris Exton</u>	<u>Jim Buckley</u> <u>Abdul Razzaq</u>
AI Induced Technical Debt	<u>Jim buckley</u>	<u>Michael English</u> <u>Abdul Razzaq</u>
Large Language Models for Matching Patients to Clinical Trials	<u>Jim buckley</u>	<u>Michael English</u> <u>Abdul Razzaq</u>
Sustainable Transport Solutions for Smart Cities	<u>Meghana Kshirsagar</u>	<u>Salim Saay</u>
Neural Network Optimisation for Image Analysis and Segemntation Problems	<u>Simon Colreavy</u>	<u>Salaheddin Alakkari</u>
Neural Network Optimisation for Large Language Models	<u>Simon Colreavy</u>	Abdul Razzaq <u>Salaheddin Alakkari</u>
Case studies for Low-code/No-Code software development	<u>Tiziana Margaria</u>	
Code generation from models to different softare Platforms	<u>Tiziana Margaria</u>	
Digital Thread: make composable components from software, hardware and data science modules.	<u>Tiziana Margaria</u>	

Research Theme Title	Supervisor 1	Supervisor 2
Software systems for advanced 3D printing	<u>Tiziana Margaria</u>	
Supervised ML in Oncology	<u>Emil Vassev</u>	
Bayesian methods for cancer prognosis	<u>Emil Vassev</u>	
Naive Bayes algorithms for cancer detection	<u>Emil Vassev</u>	
Clustering algorithms for identifying molecular subgroups of cancer	<u>Emil Vassev</u>	
NLP for capturing the subtle nuances of a person's health condition	<u>Emil Vassev</u>	
A knowledge-based testbed model for testing autonomous systems	<u>Emil Vassev</u>	
Capturing emergent abilities of generative AI	<u>Emil Vassev</u>	
Detection and Prevention of Offensive Language on Social Media	<u>Nikola Nikolov</u>	Emil Vassev
Synthetic Data Generation and Validation for Software Engineering	<u>James Patten</u>	<u>Jim Buckley</u>

<b>Research Theme Title</b>	<b>Supervisor 1</b>	<b>Supervisor 2</b>
Approaches to Improving the Explainability and Understandability of AI/ML Systems in the Era of Large Language Models	<u><a href="#">James Patten</a></u>	<u><a href="#">Jim Buckley</a></u>
Improving Neural Radiance Fields (NeRFs) Techniques for 3D Scene Reconstruction from Images and Videos	<u><a href="#">Salaheddin Alakkari</a></u>	<u><a href="#">Simon Colreavy</a></u>
An Investigation into the Use of Large Language Models in Computer Vision Applications	<u><a href="#">Salaheddin Alakkari</a></u>	<u><a href="#">Simon Colreavy</a></u>



# Department of Electronic & Computer Engineering

---

## About

The Department of Electronic and Computer Engineering (ECE) is committed to fostering excellence in teaching and research in the dynamic field of Information Communication Technology (ICT). The Department offers a range of undergraduate and postgraduate courses at the forefront of thought and practice in areas such as Electronic and Computer Engineering, Artificial Intelligence, Cyber Security, and Edge Computing. The continued growth and application of electronics, computing, and telecommunications across various industries mean graduates of these programmes enjoy a wide range of career opportunities.

## More info

<https://ece.ul.ie/>



# Department of Electronic & Computer Engineering

## Research Theme Title

## Supervisor 1

## Supervisor 2

Engineering/ML: Cyberphysical System for automating Vision-Enhanced Inspection Systems in Pharmaceutical Line Clearances

Eoin O'Connell

Tom Newe

Engineering/Vision: Advanced Photomosaicking for Multispectral Vision System in Real-Time Anomaly Detection

Eoin O'Connell

Thomas Newe

A Blockchain based Secure Authentication Technique for Ensuring User Privacy in Edge Based Smart City Networks

Kashif Naseer Qureshi

Trust management and evaluation for edge intelligence in the Internet of Things

Kashif Naseer Qureshi

Actuation and End-Effectors for Soft Robotics

Bob Strunz

Elfed Lewis

Addressing EMI Challenges in Domestic Solar Installations

Bob Strunz

David Taylor

Application of Large Language Models for developing Dynamic Survey

Arash Joorabchi

Research Theme Title	Supervisor 1	Supervisor 2
Application of edge artificial intelligence and data fusion for health-assistive medical technologies.	<u>Brendan Mullane</u>	
Cybersecuring Healthcare-IoT using AI/ML techniques	<u>Lubna Luxmi</u>	Ciaran Eising
Cybersecuring Immersive Technologies in Port Automation	<u>Lubna Luxmi</u>	<u>Eoin O'Connell</u>
Cybersecuring IoT in Smart Farming using AI/ML techniques	<u>Lubna Luxmi</u>	
Optical Radio-over-Fiber Link for 5G/6G mobile based on a Reflective Semiconductor Optical Amplifier Transmitter	<u>Michael Connelly</u>	
Deep-Learning Assistance for Difficult Laryngoscopy	<u>Colin Flanagan</u>	
Automated tool for detection of zero-day vulnerability in OT/ICS environment	<u>Muzaffar Rao</u>	<u>Thomas Newe</u>
Security of legacy OT/ICS systems	<u>Muzaffar Rao</u>	<u>Thomas Newe</u>



# Department of Mathematics & Statistics

---

## About

The Department of Mathematics & Statistics is dedicated to the applied mathematical sciences. It delivers undergraduate programmes in Mathematical Sciences and Financial Mathematics, taught postgraduate programmes in Mathematical Modelling and Data Science & Statistical Learning. The Mathematics Applications Consortium for Science and Industry (MACSI) centre encompasses the department's research, which includes many areas of applied mathematics and statistics, including the Centre for Research Training in Foundations of Data Science.

## More info

<https://www.ul.ie/scieng/department-mathematics-and-statistics>

# Current Research Projects

Department  
of Mathematics  
& Statistics

## Research Theme Title

## Supervisor 1

## Supervisor 2

Statistical developments in neural network models

[Kevin Burke](#)

Uncertainty quantification in large language models

[Kevin Burke](#)

Branching process models for spread of information and viruses

[David O'Sullivan](#)

Exploring long-range correlations in complex and social networks

[Pádraig MacCarron](#)

Bayesian methods in Survival Analysis with Application in breast Cancer and prostate cancer

[Shirin Moghaddam](#)

Research Theme Title	Supervisor 1	Supervisor 2
Translational tools for machine learning methods in survival analysis	<u>Shirin Moghaddam</u>	<u>Amir Jalali</u>
Mathematical modelling of granulation processes using population balance equations, computational fluid dynamics, discrete element methods and machine learning	<u>Mehakpreet Singh</u>	<u>Gavin Walker</u>
Development of numerical and analytical methods and their convergence analyses for nonlinear integro-partial differential equations	<u>Mehakpreet Singh</u>	
Bayesian Statistics	Ali Sheikhi	Cathal Walsh
Physics informed machine learning and population balance approaches for optimising Li-ion batteries slurry process	<u>Mehakpreet Singh</u>	<u>Michela Ottaviani (TUS)</u>
Asymptotics and numerics for the circular economy: modelling electric arc furnaces	<u>Michael Vynnycky</u>	
The mathematics of countercurrent moving-bed reactors	<u>Michael Vynnycky</u>	

Research Theme Title	Supervisor 1	Supervisor 2
----------------------	--------------	--------------

Hydrophobic multiphase flows in unsaturated porous media

Michael Vynnycky

---

Modelling the influence of polymer swelling and degradation on drug delivery

Michael Vynnycky

---



# School of Architecture & Product Design

## About

The School of Architecture and Product Design is home to a variety of undergraduate, postgraduate and research activities from Architecture, Product Design, Design Research, Human Factors and Digital Fabrication. The School represents the very best in new collaborative approaches to design education for and about people, the spaces they inhabit and the products and service systems they use. Within the School, the disciplines of Architecture and Design come together to tackle the challenges our society faces head-on. Students, practitioners, researchers and staff seek to shape environments and futures that embrace diversity, sustainability, and resilience. Whether it's revitalising neighbourhoods, reimagining public spaces, or creating innovative products, research and design work within the School aims to consistently drive us towards a more inclusive and harmonious society.

## More info

<https://www.ul.ie/scieng/schools-and-departments/school-design>

# Current Research Projects

School of Design

## Research Theme Title

## Supervisor 1

## Supervisor 2

Product Design/ Responsible Design for Women's Health

Muireann McMahon

Louise Kiernan

Exploring the use of AI tools to minimise human dependency in early-stage design research and education

Eoin White

Toward the development of practice-based approaches to transformative design research in healthcare

Eoin White



# School of Engineering

---

## About

The School of Engineering at the University of Limerick is a hub of innovation, creativity, and excellence in engineering education and research. The School is dedicated to cultivating the next generation of engineers and empowering them to develop solutions to societal challenges and make a positive impact on the world. With expertise in a wide range of engineering disciplines including Aeronautical, Biomedical, Civil and Manufacturing Engineering, the school is committed to supporting its students in their pursuit of academic and professional success.

Additionally, its strong industry connections provide students with access to excellent cooperative education opportunities enabling them to gain valuable hands-on experience and forge connections with leading engineering organisations.

## More info

<https://www.ul.ie/scieng/school-engineering>



## Research Theme Title

## Supervisor 1

## Supervisor 2

### Cell Biology

Biomimetic Model of the Spleen for Organ on a Chip: Recapitulating the fluidic micro-environment

David Newport

Patrick Kiely

Biomimetic Model of the Lymphatics: Advection Characteristics of Suspended Cells

David Newport

Kieran McGourty

Viability and Flow Induced Response of Advecting Cells in Lab on a Chip Devices.

David Newport

Kieran McGourty

### Thermo-fluids / Energy

Heat exchanger design optimisation for supercritical CO2 power cycles

Ronan Grimes

Nozzle design optimisation for supercritical CO2 power cycles

Ronan Grimes

Thermodynamic design optimisation for thermal energy recovery in heavy goods vehicles

Ronan Grimes

Vanessa Egan

Expander design optimisation for thermal energy recovery in heavy goods vehicles

Paul Weaver

Ronan O'Higgins

Research Theme Title	Supervisor 1	Supervisor 2
System level optimisation of renewable heating in industrial processes	<a href="#"><u>Ronan Grimes</u></a>	<a href="#"><u>David Newport</u></a>
Optimisation of a thermal storage solution for renewable heating in industrial processes	<a href="#"><u>Ronan Grimes</u></a>	<a href="#"><u>David Newport</u></a>
Ultrasound PIV for fluid dynamics patient specific arteriovenous fistulas (AVF)	<a href="#"><u>David Newport</u></a>	<a href="#"><u>Michael Walsh</u></a>
Biomimetic model of venous compression for medical device assessment	<a href="#"><u>Michael Walsh</u></a>	<a href="#"><u>David Newport</u></a>
Fluidic devices: development of piezoelectric micropumps with active valving. The project will involve modelling and experimental characterisation	<a href="#"><u>Valeria Nico</u></a>	<a href="#"><u>Eric Dalton</u></a>

### Mechanobiology

Biomimetic model of a tissue blood perfusion system for hemocompatibility assessment.	<a href="#"><u>Michael Walsh</u></a>	<a href="#"><u>Kieran McGourty</u></a>
Biomimetic model of a urological system focusing on the urethra for medical device assessment.	<a href="#"><u>Michael Walsh</u></a>	<a href="#"><u>John Mulvihill</u></a>
Development of a biomimetic of arachnoid granulations model to investigate the long-term effects of concussion	<a href="#"><u>John Mulvihill</u></a>	<a href="#"><u>David Newport</u></a>
Biomimetic model of cortical veins focusing on the sagittal sinus for medical device assessment.	<a href="#"><u>John Mulvihill</u></a>	<a href="#"><u>Patrick Kiely</u></a>

**Research Theme Title****Supervisor 1****Supervisor 2**

Biomimetic Model of the Sub-Arachnoid Space: Fluid mediated mechanobiology in the meninges

David Newport

John Mulvihill

**Other Engineering Themes**

Engineering/Composites: Characterisation of Laser-assisted automatic tape placement for better process modelling

Ronan O'Higgins

Giovanni Zucco

Engineering/Metal Additive Manufacturing: Experimental Characterisation and Modelling of Elastoplasticity, Anisotropy and Low Cycle Fatigue of Metals fabricated via Powder Bed Fusion/Material Extrusion

Kyriakos Kourousis

David Tanner

Engineering/Aeronautics: Modelling Uncertainty within Civil/Military Airworthiness Management towards enhanced Safety and Productivity, under the prism of the Product-Behaviour-Process framework

Kyriakos Kourousis

(Engineering Simulation/Composite Materials: Fluid-Structure-Interaction Modelling of Aeroelastic Phenomena in Composite Aircraft Structures

Philip Griffin

Giovanni Zucco

Two phase cooling for space satellites: design of evaporators suitable for two phase pumped cooling. The project will involve modelling and experimental characterisation of high pressure evaporators

Valeria Nico

Eric Dalton

Aerospace materials and processes: Impact of additive manufacture on weight saving in metallic aircraft structures

Jeremy Robinson

Kyriakos Kourousis

Research Theme Title	Supervisor 1	Supervisor 2
Mechanics: Residual stresses in very high strength aluminium alloys for aerospace	<a href="#"><u>Jeremy Robinson</u></a>	<a href="#"><u>David Tanner</u></a>
Materials processing: Low cycle fatigue Weibull Modulus determination in additive manufactured structures	<a href="#"><u>Jeremy Robinson</u></a>	<a href="#"><u>Kyriakos Kourousis</u></a>
Development of material-organoid systems for studying reproductive biology	<a href="#"><u>Eoghan Cunnane</u></a>	
Engineering/Materials: Mechanical behaviour of materials at the micro/nano scale using experimental and numerical analysis		
Sustainable Composite Materials - towards a sustainable combination of fibres, matrices and manufacturing processes with application towards renewable energy generation	<a href="#"><u>Walter Stanley</u></a>	
Generating 3D hyperspectral data with lightweight UAV system	<a href="#"><u>Peter Tiernan</u></a>	
UAV-based imaging for NDVI high resolution crop surface models to monitor nutrient requirements	<a href="#"><u>Peter Tiernan</u></a>	
External Stakeholder Management and Engagement in the Indonesian Construction Industry	<a href="#"><u>Michael Curran</u></a>	<a href="#"><u>John Spillane</u></a>
Gender Equity and Inclusion in the Indonesian Construction Industry: Barriers and Opportunities in Developing Contexts	<a href="#"><u>Michael Curran</u></a>	<a href="#"><u>John Spillane</u></a>

Research Theme Title	Supervisor 1	Supervisor 2
Health, Safety and Welfare in High-Risk Construction Environments: A Comparative Study of Irish and Indonesian Regulatory Frameworks	<a href="#"><u>Michael Curran</u></a>	<a href="#"><u>John Spillane</u></a>
The Influence of Evaporative Cooling on Thermoelectric Energy Harvesting for IoT Sensors	<a href="#"><u>Jeff Punch</u></a>	<a href="#"><u>Valeria Nico</u></a>
Bio-inspired joining of dissimilar materials and structures	<a href="#"><u>Conor McCarthy</u></a>	
Multi-scale characterisation (testing & modelling) of composite materials and composite joints	<a href="#"><u>Conor McCarthy</u></a>	
Automated robotic joining & assembly of large-scale multi-material renewable energy structures	<a href="#"><u>Conor McCarthy</u></a>	
Optical Fibre Sensors for biomedical/ medical applications	<a href="#"><u>Conor McCarthy</u></a>	
Metal additive manufacturing of porous media for heat transfer applications	<a href="#"><u>Colin Butler</u></a>	<a href="#"><u>Jeff Punch</u></a>
Background Orientated Schlieren for characterisation of two-phase heat and mass transfer	<a href="#"><u>Colin Butler</u></a>	<a href="#"><u>Jeff Punch</u></a>
Optimization of metal additive manufacturing using mechanistic models with machine learning	<a href="#"><u>David Tanner</u></a>	<a href="#"><u>Eoin Hinchy</u></a>

Research Theme Title	Supervisor 1	Supervisor 2
Sustainable Transport / An Examination of the Role of Micromobility to Decarbonise the Transport Sector	<a href="#"><u>Ross Higgins</u></a>	
Chemical Modification for Developing High-Quality Pulse Protein-Enriched Beverages with Enhanced Functionality, Sensory Properties, and Digestibility	<a href="#"><u>Mohammadreza Khalesi</u></a>	
Valorisation of Hemp Seed Protein for Applications in Food Packaging	<a href="#"><u>Mohammadreza Khalesi</u></a>	
Computational (CFD) and Experimental (PIV) determination of the Hydrodynamics in Vessels used by the Pharmaceutical Industry.	<a href="#"><u>Patrick Frawley</u></a>	<a href="#"><u>David Newport</u></a>
(Mechanics) Development of a biomimetic model of an energy harvester for powering implantable biomedical devices	<a href="#"><u>Ronan Grimes</u></a>	<a href="#"><u>Michael Walsh</u></a>
(Drug Delivery) Biomimetic model of the blood-brain barrier for accelerated drug delivery.	<a href="#"><u>John Mulvihill</u></a>	<a href="#"><u>Kieran McGourty</u></a>
(Nanomedicine) Development of a biomimetic subarachnoid space model to study neurodegeneration.	<a href="#"><u>John Mulvihill</u></a>	<a href="#"><u>Andreas Grabrucker</u></a>



# Department of Biological Sciences

---

## About

The Department of Biological Sciences delivers a wide array of taught education programmes at undergraduate and postgraduate level, in subject areas such as Bioscience, Equine Science, Food Science and Health, and Biomolecular Science.

The Department also provides service teaching in the Science Education BSc programmes, Nursing BSc programmes, MSc in Bioprocessing and MSc in Nutrition & Dietetics. Its research interests cover several aspects of human health and physiology with a particular emphasis on cancer, immunology, pharmacology, gut microbiome, and cardiovascular diseases along with a wide spectrum of projects on environment and food science.

## More info

<https://www.ul.ie/scieng/department-biological-sciences>

# Current Research Projects

Department of  
Biological Sciences

Research Theme Title	Supervisor 1	Supervisor 2
Comparing the stability, loading capacity, and health-modulating effects of resveratrol using various prebiotic fibres and plant proteins	<a href="#"><u>Daniel Granato</u></a>	
Effects of microencapsulation of turmeric extract on the induced brain-gut axis inflammation and oxidative stress	<a href="#"><u>Daniel Granato</u></a>	<a href="#"><u>George Barreto</u></a>
Cracking the Cancer Code: Harnessing Epigenetic Inhibitors and Next-Gen Sequencing to Uncover New Therapeutic Paths for cancer treatment	<a href="#"><u>James Brown</u></a>	
Bacterial-fungal-plant root interactions to support plant hosts with sulfur uptake under sustainable agricultural practices	<a href="#"><u>Achim Schmalenberger</u></a>	
Leveraging AI and Digital Pathology for Advancements in Breast Cancer Diagnosis and Personalized Treatment	<a href="#"><u>James Brown</u></a>	<a href="#"><u>Ciaran Eising</u></a>
Precision medicine approaches to hormone health in brain aging	<a href="#"><u>George Barreto</u></a>	<a href="#"><u>Dag Aarsland</u></a> ( <a href="#"><u>King's College, UK</u></a> ).
Connecting networks between inflammation, frailty, sarcopenia, and dementia	<a href="#"><u>George Barreto</u></a>	<a href="#"><u>Dag Aarsland/Miguel Borda</u></a> ( <a href="#"><u>SESAM, Norway</u></a> ).

Research Theme Title	Supervisor 1	Supervisor 2
New developments for aggregation-fragmentation-diffusion models	<a href="#"><u>Mehakpreet Singh</u></a>	<a href="#"><u>Natalia Kopteva</u></a>
Unlocking a NF-kappaB pathway targeting strategy in endometriosis	<a href="#"><u>Jason Bennett</u></a>	<a href="#"><u>Guido Franzoso (Imperial)</u></a>
Development of multicellular 3D model systems to decipher underlying immune dysfunction in endometriosis	<a href="#"><u>Jason Bennett</u></a>	<a href="#"><u>Antoine Forte (TUS)</u></a>
Understanding Cancer Epigenetics: Using Organoids and Epigenetic Inhibitors to Advance Precision Oncology	<a href="#"><u>James Brown</u></a>	<a href="#"><u>Nanasaheb Thorat</u></a>
Data mining of biosynthetic gene clusters (BGCs) for vitamin K bacteria producers in the gut and vaginal microbiome - dietary aspects and inflammatory diseases	<a href="#"><u>Fabiana A H Sarda</u></a>	<a href="#"><u>Eibhlis O Connor / Jason Bennett</u></a>
Anti-inflammatory role of Vitamin K in endometriosis	<a href="#"><u>Eibhlis O Connor</u></a>	<a href="#"><u>Jason Bennett</u></a>
The use of human in vitro mimics of the gastrointestinal system to understand gut-brain signalling in Autism	<a href="#"><u>Andreas Grabrucker</u></a>	
Characterisation of human 3D cerebral organoids to understand the role of USP7 for intellectual disabilities and Autism	<a href="#"><u>Andreas Grabrucker</u></a>	
Algae as a source of food ingredients	<a href="#"><u>Miryam Amigo-Benavent</u></a>	



# Department of Chemical Sciences

---

## About

The Department of Chemical Sciences is dedicated to delivering cutting-edge undergraduate and postgraduate education. The activities of the Department are focused in the areas of Chemical, Biochemical Sciences, Pharmaceutical and Environmental Sciences, and Chemical and Biochemical Engineering.

In addition to its undergraduate and taught postgraduate programmes, the Department of Chemical Sciences also offers a range of postgraduate research programmes (MSc and PhD) in a variety of disciplines including (Bio)Pharmaceuticals, Molecular and Nano-Materials, Bio-Materials and Process Engineering.

## More info

<https://www.ul.ie/scieng/schools-and-departments/school-natural-sciences/department-chemical-sciences>



Research Theme Title	Supervisor 1	Supervisor 2
Core-shell structured zeolites for separation and catalytic conversion	<u>Bar Mosevitzky Lis</u>	
Surface engineering of bulk mixed metal oxide catalysts for the catalytic valorisation of renewable feedstocks	<u>Bar Mosevitzky Lis</u>	
Computational Unravelling of Interface Processes in Energy Materials for Light-Harvesting and Photocatalysis	<u>Matthias Vandichel</u>	
Unravelling of Catalytic Processes via First-Principles Reaction Mechanism Studies and Kinetic Modelling	<u>Matthias Vandichel</u>	
Chemistry/Development of Protein Modified Nanomaterials	<u>Edmond Magner</u>	<u>Shalini Singh</u>
Development of high energy density battery chemistries	<u>Hugh Geaney</u>	
Industrial ecology: rebound effect of Ozone Depleting Substances replacements on global greenhouse gas inventories	<u>Yvonne Ryan</u>	<u>Reena Cole</u>
Industrial ecology: MFA of mercury-added consumer products (cosmetics, remedies etc.), implications for emissions inventories and global Hg accounting mechanisms	<u>Yvonne Ryan</u>	

Research Theme Title	Supervisor 1	Supervisor 2
Chemical Sciences	<u>Yvonne Ryan</u>	<u>Colin Fitzpatrick</u>
Machine Learning in bioPharmaceutical process development	<u>Gavin Walker</u>	
Biphasic electrosynthesis of conducting polymer thin films for energy conversion and storage applications	<u>Micheál D. Scanlon</u>	
Electrocrystallization at the interface between two immiscible electrolyte solutions	<u>Micheál D. Scanlon</u>	
The Effects Of Integrating Conjugative Elements (ICEs) on Bacterial Pathogens	<u>Michael P. Ryan</u>	
From Coffee Shops to Diabetes Treatment: Exploring the Use of Coffee Grounds in Controlling Diabetes Using Sustainable Alternatives	<u>Luis Padrela</u>	<u>Clarinda Costa</u>



# Department of Physics

---

## About

The Department of Physics studies fundamental laws of nature. Its research and education advance and implement interdisciplinary scientific knowledge so that materials, devices, and energy can be engineered and exploited for the benefit of human civilisation including sustainable development goals. The Department offers an equitable, inclusive, vibrant and intellectually stimulating environment for students, faculty, and researchers alike. The undergraduate and graduate programmes promote disruptive, blue-sky yet pragmatic critical thinking, analytical and hands on as well as soft-skill development, and leadership in translation of breakthrough ideas and technology into new knowledge and intelligent devices.

The Department is known for its excellence in electron microscopy. It is home to the Titan Transmission Electron Microscope, a cutting-edge multimillion euro instrument capable of imaging on an atom by atom basis.

## More info

<https://www.ul.ie/scieng/schools-and-departments/school-natural-sciences/department-physics>

# Current Research Projects

Department  
of Physics

Research Theme Title	Supervisor 1	Supervisor 2
Sensors for Flow Batteries	<a href="#"><u>Robert Lynch</u></a>	<a href="#"><u>Fernando Rhen</u></a>
Vanadium and Iron Reaction Kinetics at Flow Battery Carbon Electrodes	<a href="#"><u>Robert Lynch</u></a>	<a href="#"><u>Andrea Bourke (TUS)</u></a>
Plasmonic Liposome nanomedicine and Raman Spectroscopy for biomolecular fingerprinting of cancer	<a href="#"><u>Nanasaheb Thorat</u></a>	
Coherent Raman imaging of (drug and plastic) nanoparticles complexes in biological (brain) cells	<a href="#"><u>Christophe Silien</u></a>	
Coherent Raman super-resolution microscopy	<a href="#"><u>Christophe Silien</u></a>	
Second Harmonic Generation via Random Quasi-Phase matching using Biocompatible Films	<a href="#"><u>Ning Liu</u></a>	<a href="#"><u>Christophe Silien</u></a>
Wide-field transient reflection imaging to reveal evanescent waves in microstructures	<a href="#"><u>Ning Liu</u></a>	<a href="#"><u>Christophe Silien</u></a>
Nanocrystal-based light emitting diodes using sustainable materials	<a href="#"><u>Ning Liu</u></a>	

# Contact Us



---

**University of Limerick**  
**Limerick**  
**V94 T9PX**  
**Ireland**

---

**[www.ul.ie/scieng](http://www.ul.ie/scieng)**  
**[scieng@ul.ie](mailto:scieng@ul.ie)**

---

**Twitter:** @sci\_engUL  
**Instagram:** @sci\_engUL  
**Facebook:** Faculty of  
Science & Engineering at  
University of Limerick  
**LinkedIn:** Faculty of Science  
and Engineering, University  
of Limerick

---