



# FACULTY OF SCIENCE & ENGINEERING

Faculty Newsletter

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## New Director for MSSI



On September 1, 2010, Professor Noel O'Dowd assumed the role of Director of the Materials and Surface Science Institute (MSSI). Prof O'Dowd holds the Chair of Mechanical Engineering in the Department of Mechanical and Aeronautical Engineering at the University of Limerick. He received his PhD in Solid Mechanics from Brown University, USA, in 1992 and spent one year as a Research Fellow at the Graduate Aeronautical Laboratories at the California Institute of Technology. Prof O'Dowd was on the academic staff at Imperial College London for thirteen years as Lecturer, Senior lecturer and Reader before taking up his current post at the University of Limerick in 2006. Professor O'Dowd is vice-chair of the American Society of Mechanical Engineering committee on Materials and

Fabrication and is a Visiting Professor at Imperial College London. Professor O'Dowd is also a member of the Composites Research Centre at the University of Limerick and his research is in the area of computational mechanics and fracture mechanics of engineering materials. He has published over a hundred research articles in these and related areas.

Professor O'Dowd is taking over from Professor Edmond Magner who has led MSSI since October 2003. MSSI has grown significantly in this period and now houses 228 researchers. Prof Magner's achievements in the role are many - a small subset are highlighted below:

Led MSSI's PRTL14 application, obtaining 5.8M euros, significantly developed MSSI capabilities in nanomaterials and enabled upgrade and substantial enhancement of MSSI facilities (3.5 M euros equipment funding).

Developed extensive new collaborations with CRANN (TCD), Tyndall National Institute, NUIG, UCD and DIT, a wide range of research groups from across all the universities who utilise MSSI facilities.

Led introduction of pilot-scale nanoscience graduate programme

Led HEA RFES funding application, obtaining 1.5 M euros in capital funding for composite and glass materials

Established MSSI Distinguished Lecturer series which brings two world leading experts to MSSI for short stays each year, significantly expanded MSSI research forum which now hosts 60 speakers per annum with ca 20 speakers from abroad coming to MSSI each year.

Led UL bid as a partner in SFI Solar Energy Cluster which received 0.9M euros in funding.

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## Architecture Accreditation

Full accreditation of UL architecture programme has been 'accorded' by the Board of Architectural Education and has been formally ratified by RIAI Council. The University of Limerick and the Faculty of Science and Engineering are now home to a fully accredited architecture programme.

## Shortlisted for Dyson Design Award



James D'Arcy, a recent graduate of the BSc Product Design and Technology programme in UL was shortlisted for the prestigious international James Dyson Design awards for a revolutionary new oxygen-delivery system. James was the only Irish entry to make it to the finals with a device called Flo2w. The invention holds an oxygen tube to a patient's head with an adjustable headpiece that can be clipped on and off. James beat more than 500 entries from 21 countries across the world to make the final 18. Flo2w is a new way of delivering oxygen to a patient and eliminates many problems associated with the current device that supplies oxygen. The system

integrates a new form of regulating oxygen in an innovative and easy way for both the patient and health care professional.

## MSSI Best Undergraduate FYP Award



The MSSI Best Undergraduate FYP Award 2010 was made to Ms Claudia Coughlan, a student on the BSc in Pharmaceutical and Industrial Chemistry degree programme who was supervised by Dr Kevin M. Ryan, for her project entitled '*The Cation Exchange of CdS Nanocrystals Using Copper Based Ionic Liquids to Form Cu<sub>2</sub>S Nanorods, for their Integration into Low Cost Solar Cells*'. Claudia undertook a complex project which required her to quickly gain competence in II-VI nanocrystal synthesis, cation exchange processes and a suite of characterisation techniques from HRTEM to XRD. Her experimental work was extremely thorough and was matched with a deep understanding of the chemistry of the processes, which is a testament to considerable time spent reading the background literature. Claudia was capable of working on her own initiative making several cutting edge insights into this research field. The extent of work carried out in

terms of synthesis and characterisation is of publishable quality which is an outstanding achievement for a short research project.

Claudia was presented with the award by Professor Edmond Magner, Director of MSSI, following the Science and Engineering Conferring Ceremony on Tuesday, 24 August.

## Naughton Scholarships 2010

Congratulations to Sorcha McGuire, first year Product Design and Technology, and Vincent O'Brien, first year Computer Engineering, who won first and second place respectively in the Naughton Scholarships 2010. A third UL student, James Togher, Construction Management, was also among the 6 finalists. The other three finalists are all studying Undenominated Engineering at NUIG.

The Naughton Scholarships ([www.thenaughtonfoundation.com](http://www.thenaughtonfoundation.com)) are awarded to students sitting at least two science subjects for their leaving certificate and pursuing a full time course in science, engineering or technology. They are worth €4,000 for each year of the student's third level course.

## Outstanding Technical Paper Award

The Sam Y. Zamrik Literature Award for the Outstanding Technical Paper, *ASME Journal of Pressure Vessel Technology* for 2010 was recently awarded to MSSI Member Professor Noel O'Dowd for the paper "Fracture Assessment Procedures for Steel Pipelines Using a Modified Reference Stress Solution". Co-authors include Tomasz Tkaczyk and Kamran Nikbin. The award was formally presented at the Honors and Awards Luncheon on July 21st in Bellevue, Washington.

## Declan Ryan, BSc Equine Science graduate wins UK and Ireland Thesis of the Year Competition



Declan Ryan a first class honours graduate of the BSc Equine Science won the Eqvalan Thesis of the year competition in Stoneleigh UK in November for his project

'Haematological Parameters of Irish thoroughbred Horses: Normal Values and the Effect of Age and Sex'. This competition, run by the Royal Agricultural Society of England and sponsored by Merial Animal Health, is open to every agricultural and equine university and college in the UK and Ireland.

During Declan's time at UL he has been awarded the Coolmore Award for the best final year thesis, the HRI prize for Services to the Thoroughbred Industry, the Frank McGourty Annual Award for academic achievement and now the Eqvalan Thesis of the Year Award. Declan has commenced work with racehorse trainer Bruce Hedley in Santa Anita Racetrack in California



### Globe Forum 2010 'Early Career Research Award'

Congratulations to David Connolly, PhD Student with the Charles Parsons Initiative, Physics Department who won the **Globe Forum 2010 "Early Career Research Award"**. The conference was held over two days from Wednesday 17<sup>th</sup> – Thursday 18<sup>th</sup> November 2010 at The Convention Centre in Dublin.

The award was open to all individuals who are currently completing or have completed a PhD in the last 5 years in relation to sustainability i.e. energy, health, food, etc.

David was presented with his award by the former President, Mary Robinson and the prizes include €600, an Apple iPad, a mentoring programme to help commercialise his ideas including a €5000 PR consultancy package, and an all-expenses paid trip to the next two Globe Forum Conferences in Stockholm and Eindhoven in 2011.

### Cover Article



MSSI member, Professor Tim McGloughlin has recently published a journal article on the modelling of aneurysm rupture behaviour in conjunction with Dr. Barry Doyle. The article entitled '*New approaches to abdominal aortic aneurysm assessment - Engineering insights with clinical gain*' was published in the American Heart Association journal, *Arteriosclerosis Thrombosis and Vascular Biology*, which holds an impact factor of 7.235. The article was also chosen as the cover article for the journal. The article is receiving considerable attention in the field and Professor McGloughlin has given invited talks at the International Meeting on Aneurysmal Disease in Leige, Belgium and the 6th Beijing International Symposium on Biomechanics in Beijing, China.

### Best Paper Award

A paper written by MACSI researchers Sergey Melnik, Adam Hackett, and James Gleeson (in collaboration with Mason Porter of Oxford and Peter Mucha of the University of North Carolina) has been recognised in the Best Papers awards at the European Conference on Complex Systems ([www.eccs2010.eu](http://www.eccs2010.eu)). This conference, which was held in Lisbon in September, is the largest European conference on complexity and complex systems. Held annually since 2004, ECCS attracts more than 300 scientific contributions to 6 parallel sessions.

The paper by Melnik *et al.* was awarded joint second prize, which includes a cash prize sponsored by Springer (see [www.eccs2010.eu/bestpaperawards](http://www.eccs2010.eu/bestpaperawards) for details). The focus of the paper is on the effectiveness of idealized mathematical approximations in describing the action of dynamical processes operating on complex networks – think, for example, of the spread of rumours over the Facebook social network, or the spread of computer viruses over the Internet network. Melnik and his co-authors show that many idealized models (that are known to have analytical solutions) work surprisingly well on certain real-world networks such as Facebook, despite the fact that these networks do not satisfy the mathematical assumptions underlying the analytical results. They identify basic structural properties of the networks which can be used to predict whether the idealized theories will give accurate results when compared, for example, with numerical simulations of the processes on the network in question.

The title of the paper ("The unreasonable effectiveness of tree-based theory for bond percolation on networks with clustering") is a tribute to the famous article by Eugene Wigner on the surprising effectiveness of mathematics in the natural sciences. A preprint version is available on the ArXiv server at [arXiv.org/pdf/1001.1439v1.pdf](http://arXiv.org/pdf/1001.1439v1.pdf). The work of the UL researchers is funded by Science Foundation Ireland through a PI award and the MACSI Mathematics Initiative award ([www.macsi.ul.ie](http://www.macsi.ul.ie)).

## Lifetime Service Award



Many readers will know of Kevin Ryan's many contributions to UL over the years: as a professor of software engineering, a head of department, a faculty dean, a university vice president, and founder and until recently director of Lero - the Irish Software Engineering Research Centre. Kevin's contributions outside UL have been equally impressive, and in September 2010, at the International Requirements Engineering Conference in Sydney, Australia, Kevin was presented with a *Lifetime Service Award* by his international research community. The citation on the award reads: "Lifetime Service Award to Kevin Ryan. In appreciation for long-term and dedicated service to the Requirements Engineering Community. Notable contributions include serving as General Chair in 1999 and Programme Chair in 2009, as well as impactful contributions to areas of Requirements Engineering

Research". Kevin is currently on sabbatical at the University of Technology, Sydney.

## Research Excellence Award

Professor Tim McGloughlin was awarded the Research Excellence award in the Faculty of Science and Engineering at the recent conferring. This award is made annually to a faculty member who has made an outstanding contribution to research and scholarship over the previous 5 years.

## 2010 Earnshaw Medal

Eileen Armstrong a 2010 BSc Applied Physics graduate and current PhD postgraduate, was awarded the 2010 Earnshaw Medal by the Institute of Physics for her final year project entitled: Electron Microscopy Study of Hydrothermally Synthesized Single Crystal Cadmium Sulfide. Her project supervisor was Dr. Colm O'Dwyer

## First Prize at Research Colloquium

MSSI post-graduate student Darragh Gaffney recently won first prize for his presentation entitled "Specific Adsorption of His6-tagged Spi onto Nickel Functionalized P.5 Mesoporous Silicate" at the 62nd Irish Universities Chemistry Research Colloquium held at Queen's University Belfast on 1-2 July 2010.



## 1st Prize at Design Workshop, Hamburg

SAUL (School of Architecture University of Limerick) have won 1<sup>st</sup> prize at the Hafen City University International Design Workshop in Hamburg, Germany. 5<sup>th</sup> Year students from the School of Architecture at the University of Limerick participated in a week - long design workshop with 6 other Universities from across Europe. The project was to connect the large docklands area of Hamburg to the city. The prizes were announced by a jury of 5 which included the city of Hamburg's chief architect and city planner. The jury commended the SAUL team for the way in which they developed the project, the inventive models, and the inspiring ideas about how to use the water's edge. Other participating schools were the School of Architecture at Sheffield University (who were also awarded a 1<sup>st</sup> prize) the KTH in Stockholm, La Salle School of Architecture Barcelona, Bilgi University Istanbul Turkey, Oxford Brookes University, The University of the Ryukyus, Okinawa, Japan and Hafen City University Hamburg



### CIOB Accreditation

The Chartered Institute of Building (CIOB) has formally granted Accredited Centre Status upon the Department of Materials Science and Technology (Civil Engineering and Materials Science), and has accredited the BSc in Construction Management + Engineering programme (LM082) as being of the required standard to allow graduates exemption from the educational requirements for Chartered Membership of the CIOB. These accreditations follow an ongoing process which culminated in a review visit by CIOB representatives to the University on 17 November last. The reviewers were particularly complementary of the Value Based Thinking approach underpinning the programme, especially in the context of the growing importance of construction leadership and management in an increasingly complex industry. The University of Limerick is the first, and currently only, Irish University holding Accredited Centre Status from the CIOB and offering a CIOB-accredited programme.

The mission of Construction Management + Engineering is to develop the future leaders of the construction industry within a rigorous, collaborative and invigorating environment. Chartered Member status of the CIOB, represented by the designations MCIOB and FCIOB, is recognised internationally as the mark of a true professional in the construction industry. This accreditation is therefore of immense value to our graduates of Construction Management + Engineering; and particularly so to those working abroad, where their academic qualification is now formally recognised as being of the highest international standard. Current and future students will benefit through unequalled access to scholarships, awards and international student challenges, which it is hoped will foster a creative competitive culture throughout the programme thus raising the profile of the programme and its graduates within industry.

The Chartered Institute of Building is the international voice of the construction industry, has 42,000 members worldwide, and represents skilled construction managers and professionals involved in the total building process.

### MSSI Spin-Out, HKPB, Launches Biotechnology Plant

HKPB Scientific recently announced the launch of its new biotechnology plant in Nenagh, Co Tipperary. HKPB Scientific, a biotechnology and innovation company will be starting commercial production of medical technologies with the potential to dramatically reduce surgical costs for patients and hospitals. The start-up has developed a system for the low-cost and efficient production of vital bio-medical materials. With the announcement of the new plant combined with a pipeline of R&D, HKPB are looking to create up to 200 jobs in the mid west region over the next five years.



Company CEO, Dr Donncha Haverty said the company's technologies will reduce the need for repeat surgeries and reduce the problems people encounter with bio-medical devices. "We are an innovation company with aims to commercialise a number of other products in the coming years in the biomedical field", Dr Haverty explained.

Welcoming the news, Professor Brian Fitzgerald, Vice President Research at the University of Limerick, stated; "the past year has been a very successful one for the University in terms of its translational research approach, particularly in relation to spin-out companies". He went on to add, "it is particularly pleasing to see the high value jobs that are being created by these spin-outs."

HKPB holds a number of international bio-tech patents and has developed a unique system for the production of bio-material, hydroxyapatite. The market for this material is estimated to be worth €500 million annually.

HKPB was established in 2008 by UL based researchers, Dr Donncha Haverty and Dr Brendan Kennedy. The company recently secured funding from Tolisons Private Equity and Enterprise Ireland.

### Sustainable Design Seminar

With Sustainability becoming a hot topic, there is a need now more than ever for professional and student designers to grasp the concepts underpinning the subject. Now in its 6<sup>th</sup> year, Reform is an annual sustainable design seminar and workshop series organised as part of Design Week Ireland. The events are organised by a team comprising of members of the UL Product Design + Technology team, staff from The Institute of Technology Carlow and the Cultivate Centre in Dublin. Since its inception the Reform events have showcased some of the most inspiring examples of Sustainable Design thinking and practice at both a national and international level

Reform 2010, held at the Science Gallery Dublin (as part of the Green Machines exhibition) on the 5<sup>th</sup> of November, focused on growing the fledgling sustainable design network in Ireland. It provided a platform for designers and companies to explore opportunities for entering this growth economy. The event took an innovative format this year, with 10 speakers adopting the 'Pecha Kucha' style of presentation- each presenter presents 20 slides with only 20 seconds for each slide. This dynamic format allowed for a lot of information to be shared in very short period of time! The topics included Eco Furniture Design, Sustainable fashion design; Design for Society projects in Uganda and Guatemala; The Dublin Bike Scheme; Material innovations for



design; Creative Thinking; Bike reclamation; Urban planning and landscaping and The Village project in Cloughjordan. Four parallel workshops were held between the talks where participants were given the chance to harness their collective creativity and share knowledge to develop design solutions for current and



future issues. The results from the workshops and the inspiring talks have not only served to raise awareness but also to re-assure us that the future for sustainable design is bright in Ireland.

### Product Design + Technology exhibit at the Midwest Showcase



The *Midwest Showcase* of entrepreneurial excellence was held at Thomond Park on the 21<sup>st</sup> of October to gather together the best examples of local entrepreneurship to demonstrate their achievements and share their knowledge. Students from the Product Design and Technology programme were invited by the host, *Enterprise Ireland*, to exhibit some examples of work undertaken by the fourth year class of 2009 and 2010. The purpose of attending was to demonstrate the power of design and creative thinking as applied to entrepreneurial endeavour. The projects displayed the early commercialisation process from idea germination to concept development, through to proof of concept models and prototypes. Amongst the projects displayed was the "FLO2W", an oxygen supply system for patients in hospitals. "FLO2W" was Ireland's first finalist in the International Dyson Award this year. "Midwest Showcase" provided an important opportunity for the

University of Limerick to show that it is producing graduates with the needed skills and knowledge to lead the country out of the hard times ahead.



### The Mid-West Region Maths Week 2010

The NCE-MSTL (National Centre for Excellence in Mathematics and Science Teaching and Learning) and MACSI (Mathematics Applications Consortium for Science and Industry) both based in the University of Limerick, in association with Discover Science and Engineering, organised the maths events in the mid-western region for Maths Week 2010. Maths week kicked off on Friday 8<sup>th</sup> October with maths busking, a first for Limerick. A team of enthusiastic students, researchers and teachers gathered at the Milk Market in Limerick and entertained all age groups with performances of tricks, puzzles and games while communicating the wonder of maths. Maths week travelled to Thurles and Tipperary Town on Monday and Tuesday. Here Christine Campbell gave a fun hands-on Anyone4maths workshop to 2<sup>nd</sup> year students at six secondary schools.

On Tuesday 12<sup>th</sup> October Colin Wright explained to over 200 senior cycle secondary school students in St Flannan's College, Ennis, Co. Clare, how maths can help you learn juggling and how understanding maths can make you a much better juggler. Thursday 14<sup>th</sup> October, Rob Eastaway addressed over 700 senior cycle secondary school students from Limerick, Clare, Tipperary and Cork in the Concert Hall. Rob entertained his audience with the mathematics of competition using examples as diverse as nuclear deterrent, advertising, speed dating, auctions and David Beckham's goal taking strategy or did he have one? For further details on Rob's lecture go to <http://www.macsi.ul.ie/>.



Not forgetting the younger age group, ten primary schools visited the University of Limerick. In total 259 3<sup>rd</sup> and 4<sup>th</sup> class pupils from Clare, Tipperary and Limerick engaged in fun and innovative mathematical workshops which included Who Wants to Be a Maths Millionaire, Sudoku, Maths Trail and a couple of Engineering Activities where

pupils had to build a solid structure using blocks and lollipop sticks or spaghetti and marshmallows.



Paul Stephenson's Magic Mathworks Travelling Circus, a travelling hands-on maths workshop for primary pupils, ran workshops in Mary Immaculate College during the week. Finally for teachers and educators, Adrian Oldknow, Emeritus Professor at the University of Chichester in the UK provided an entertaining, interactive talk on the role of technology in the teaching and learning of mathematics. Prof. Oldknow introduced a variety of technology which can enhance teaching including TI-Nspire, GeoGebra, Cabri, Google Earth, Geometer's Sketchpad, MS Excel and more. He demonstrated how "toys" can be used in the teaching of mathematics. One such example includes a video clip of the junior STOMP rocket which together with the use of Tracker enables students to study the trajectory of the flight of the rocket, estimating the launch angle, launch velocity, time of flight and horizontal distance travelled. In addition, it adds fun to learning! For information on the talk see [www.nce-mstl.ie](http://www.nce-mstl.ie). Maths Week Ireland is coordinated by CALMAST (Waterford Institute of Technology). The Mid-West Maths Week events were sponsored by Discover Science and Engineering.



## Limerick Festival of Science, Engineering &amp; Technology

8th—13th November 2010

The Faculty of Science & Engineering organised seven days of interactive shows and demonstrations as part of National Science Week 2010 attracting some 6000 visitors to the Campus over the week. The highlight of UL Science Week was the Festival of Science, Engineering & Technology, an open day for all the family held on Saturday 13th November. Some 3,500 visitors attended the open day in spite of poor weather conditions.

An exciting programme of events attracted full houses and included Sarah Hayes's "Science Magic Show", Professor John Breen's "Mini Beasts in your backyard" interactive talk, Robert Hill, European Space Agency, enthralled visitors with giant glowing gas clouds, black-holes and galaxies in his 3-D "Cosmic Explorers" shows and James Soper engaged his audiences in feats of juggling using physical forces, gravity, magnetism -pushes, pulls, twists and balance to explain the "Real Science of the Circus Shows"!! Other events included Paul Stephenson's Magic Mathworks Travelling Circus workshops and Paul McCrory's exciting Magic, Science & Mystery shows. The aim of Science Week is to ignite public interest and awareness in science and engineering, especially in young people and highlight how these impact on everyday life.

Local industries who participated included Analog Devices, Intel Shannon, Scientific & Chemical and Merek, Sharp and Dohm, Falconry and Wildlife displays in addition to the National Centre for Excellence in Mathematics & Science Teaching and Learning and the academic departments and research centres in the Faculty of Science & Engineering. The programme targeted all age groups with interactive displays and exhibits, guest speakers, flight simulators, and much more. Faculty and staff were on-hand to give advice on the various career options available to graduates of science, engineering and technology degree programmes.



Adults and children enjoying themselves during Science Week







Graduation Autumn 2010



Bristol Myers Squibb Student of the Year Prize was presented to Tadhg Kennedy, BSc Pharmaceutical & Industrial Chemistry



Ross Fennessey, BSc Industrial Biochemistry received the Serosep Industrial Biochemistry Student of the Year Prize



BSc Health & Safety Course Director, Dr. Tom O'Dwyer presents the Novartis Student of the Year Prize to Aine Newell



Physics Department Graduates and Staff



Rosemarie Webb who graduated with a Masters in Architecture pictured with Mr. Peter Carroll and Dr. Anna Ryan.



Joseph Moriarty who won the IET Prize with his parents and Dr. Cathal Heavey, Head of M&OE Dept



Christine Madden, Diploma in Safety Health & Welfare at Work receiving her GH Health & Safety Student of the Year Prize

## Graduation Autumn 2010



ESB Student of the Year Prize was presented to Adrien Hogan, BSc Environmental Science



Dr. Ronan Dubar and Dr. Aoife Finneran received their PhD awards from the Department of Manufacturing and Operations Engineering

Pictured From Left to Right: Dr Seamus Gordon, Dr Niall Seery, Dr Ronan Dunbar, Dr Aoife Finneran, Dr Leonard O'Sullivan, Dr Cathal Heavey

## School of Architecture Activities

A team of SAUL students contributed to a student design charette at the annual RIAI conference held in Westport in October. For further details see: <http://www.youtube.com/watch?v=vAVXcDnyBIY>

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A SAUL student has initiated a series of Pecha Kucha events in Limerick city to enhance the exchange of ideas amongst creative professionals.

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A team of SAUL students and staff ('The Drawing Board') has contributed to the Table of Contents exhibition hosted at LSAD through an architectural intervention in their church gallery. <http://thedrawingboard10.blogspot.com/>

*Mechanical Testing Expert*

Dr. Peter Tiernan, Dept of Manufacturing and Operations Engineering, has been selected as a mechanical testing expert for the European CEN TC 158/WG14 Committee. This group has responsibility for the standardisation of protective helmets for sports activities regarding competitions, training and recreational activities in Europe. Dr. Tiernan was selected on this Committee as a result of his expertise and experience in the area of high speed impact testing of materials and structures.

## New Staff

The Faculty welcomes the following new staff:

Life Science: Audrey O'Grady, Achim Schmalenberger, Patrick Kiely, Soraya Morscher

Mechanical and Aeronautical Engineering: Ronan O'Higgins

## Retirements

Best wishes are extended to the following who retired recently:

Eoghan MacEoghan, M&S  
John Mullane, CES

## Dates for your Diary

Winter Conferings 17 - 19 January 2011

Spring Semester - 24 January to 29 April 2011

Spring Exams: - 3 - 16 May 2011

Summer Exam Board: 9 June 2011

S&E Faculty Boards: 2 February & 11 May 2011