SCIENCE

The School of Science, which undertakes tuition and research in laboratory and field sciences and in informatics, is made up of two Departments: the Department of Chemical and Life Sciences and the Department of Computing, Mathematics and Physics.

The School of Science in Waterford Institute of Technology is accredited to make its own awards up to PhD level, in recognition of the excellence of its teaching and research. A committed team of lecturers and support staff is available to make the student experience at WIT an enjoyable and rewarding one. The School has a strong research ethos, with internationally recognised research groups working in such fields as environmental science, separation science, genetics, telecommunications software, human factors in computing, e-Learning and automotive software engineering.

The Eugene Lawler Graduate School of Computing is respsonsible for postgraduate acitivties in Computing, Maths and Physics in WIT. Prof. Eugene Lawler made fundamental contributions to computer science in scheduling theory, network/matroid theory as well as pioneering the development of polymatroids. He was respected as a visionary teacher at the University of California, Berkeley.

The Graduate School implements a structured Industry Focused Doctoral programme that aims to support the creation of sutainable high technology employment in the South East Region. Its associated incubation facilities have a successful track record in creating SMEs with a high technology focus. Twice a year the Graduate School organise a one-week Ph.D. Summer School on Scientific Computing with M.V. Lomonosov Moscow State University, Technical University of Poznan, Kyiv National Taras Shevchenko University, National Technical University "Kharkiv Polytechnic Institute" (Ukraine), Saint-Petersburg State University, Nanjing University of Information Science and Technology.

CONTACTS

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School Administrator: Ms Fiona Power
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School Secretary: Ms. Eleanor Reade
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Department of Chemical & Life Sciences

Acting Head of Department:
Peter McLoughlin, PhD, FICI
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Department Secretary: Ms. Nan O'Brien
Tel: +353-51-845625 E: nobrien@wit.ie

Department of Computing, Mathematics & Physics

Head of Department:
Mícheál Ó hÉigeartaigh, M.Mgt.Sc., PhD
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Department Secretary: Ms. Mary Ryan
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"I have a great interest in my research area and enjoy both the practical and the literature-based side of the project. I have had the opportunity to collaborate with two universities in the UK and travel to Japan for an international conference while at the same time enjoying a pleasant working environment due to the large number of postgraduates here in WIT."

Larry Fitzhenry, Research Masters in Science

RESEARCH GROUPS/CENTRES

Telecommunications Software and Systems Group - TSSG
Mr. Mícheál Ó Foghlú E: mofoghlu@tssg.org

Pharmaceutical and Molecular Biotechnology Research Centre - PMBRC
Dr. Peter McLoughlin E: pmcloughlin@wit.ie
Dr. June Frisby E: jfrisby@wit.ie

Eco-Innovation Research Centre - EIRC
Dr. Peter McLoughlin E: pmcloughlin@wit.ie
Dr. Brian Murphy E: bmurphy@wit.ie

Health Informatics Research Group - HIRG
Dr. John Wells E: jwells@wit.ie
Mr. T.J. McDonald E: tmcdonald@wit.ie

Macular Pigment Research Group - MPRG
Dr. Stephen Beatty E: sbeatty@wit.ie
Dr. John Nolan E: jnolan@wit.ie

Optics Research Group - ORG
Dr. John Houlihan E: jhoulihan@wit.ie

Automotive Control Group
Mr. Brendan Jackman E: bjackman@wit.ie

eLearning Technologies Research Group - WeLearnT
Ms. Mary Barry E: mbarry@wit.ie
Ms. Mary Power E: mpower@wit.ie
Ms. Catherine Fitzpatrick E: cfitzpatrick@wit.ie

Centre for Information Systems and Technoculture - INSYTE
Dr. Larry Stapleton E: lstapleton@wit.ie
Mr. Liam Doyle E: ldoyle@wit.ie

Centre for Scientific Computing - CSC
Dr. Noreen Quinn E: nquinn@wit.ie

FURTHER RESEARCH AREAS/TOPICS

Mathematics
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Multimedia
Mr. Patrick Felicia E: pfelicia@wit.ie

Telecommunications Software & Systems Group - TSSG

The Telecommunications Software & Systems Group (TSSG) was founded in1996. Since then, it has grown from 3 to around 160 members of staff and students comprising WIT faculty, full-time principal and senior investigators, centre managers, researchers - including programmers and engineers - research students and support staff. All the funding for the TSSG has been won in competitive tenders for national and international research funding. The TSSG's main area of research is communications software services encompassing emerging architectures for management of complex telecommunications and Internet systems as well as next generation service development and deployment. Perhaps the best short description of this is the Future Internet Infrastructure & Services. The TSSG has strong expertise in the areas of distributed systems and service oriented architectures, particularly when applied to the communications and telecommunications domain.

The TSSG has two primary divisions - the Research Division and the Commercial Division. Each of the divisions is composed of centres, each with its own thematic focus. Together the TSSG encompasses a balanced portfolio of active research projects reflecting a synergistic mix of basic research (strategically oriented), applied research, pre-product development, and commercial spin-off activities. Thus the TSSG sees itself as an exemplar of a new vision of research in Ireland that is both trans-disciplinary (combining mainly engineering, computing and business) and pursues a combination of academic and commercial excellence. With 36 current active funded research projects in Jan 2009 (primarily Irish and European funding), and a history of 80 funded projects (of which the TSSG has been the lead partner in 70%), and a total of over €53 Million 1996-2009, the TSSG is the largest group in Ireland engaged in such a critical mass of activity relating to communications software services, and indeed is one of the most successful integrated research clusters in any academic domain in Ireland.

The TSSG is located in the ArcLabs Research and Innovation Centre on the Carriganore West Campus of WIT.

PROJECT	FUNDING
FutureComm	IE HEA PRTLI Cycle 4
SFI SRC FAME	IE SFI
16 Projects	Enterprise Ireland
16 Projects	EU FP6/FP7
2 Projects	EU/EI EUREKA CELTIC

Contact:
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Website: www.tssg.org

Pharmaceutical and Molecular Biotechnology Research Centre - PMBRC

The PMBRC is comprised of a research team with proven expertise in chemical, pharmaceutical and biomedical research and links to international experts and specialists in the pharmaceutical, biopharmaceutical & biotechnology sector. The 700m^2 state-of-the-art research facility is located on the main WIT campus.

Our major research activities include:

- Polymeric drug delivery technologies (incorporating ophthalmic, oral and respiratory drug delivery)
- Novel process technologies (analytical & catalytic applications)
- Separation Science
- Molecular Biotechnology (biotransformations & therapeutic molecules)
- Nanotechnology
- Novel sensor technologies based on plasmonic nanostructures
- Organic electronics

Collaborations
EirGen Pharma Ltd, Genzyme Ireland Ltd, Bausch & Lomb Ireland, TEVA and Merck, Sharp & Dohme (Ireland) Ltd.

Funding
Funding secured from Enterprise Ireland's (EI) Applied Research Enhancement Initiative, EI's Innovation Partnership with Genzyme Ireland Ltd, The Technological Sector Research Initiatives (Strand I & Strand III), HEA Research Facilities Enhancement Scheme 2008 and HEA and EI Infrastructure grants.

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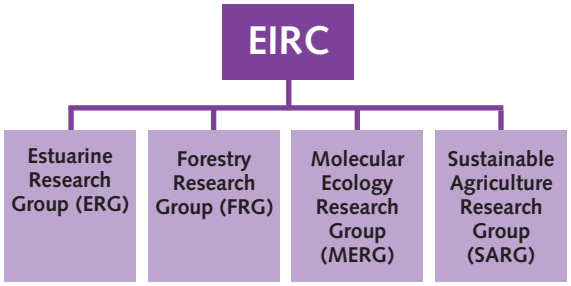
Eco-Innovation Research Centre - EIRC

'Eco-Innovation' is a term commonly used to describe new products, technologies, services and processes that contribute to sustainable development. With vast commercial potential, Eco-Innovation is identified by WIT as a key research Centre of Excellence (CoE), characterised by international reputation, strong links with industry & the international academic community, and is prioritised for development under the WIT Strategic Plan 2007-2010. These strategies support the creation of a knowledge society by establishing sustainable centres of research, development and innovation, which are world leaders, capable of attracting resources and investment from the national and international arena.

Research activities at the EIRC focus on the innovative development of 'high value-added technologies/products/processes from natural resources' and 'low environmental impact processing/growth methods'. Sustainable solutions for the future development of industries such as the marine, agriculture and forestry sectors, and 'green' chemistry for pharmaceutical synthesis, require a collaborative cross-disciplinary approach. Eco-Innovation research at WIT is supported across a wide range of areas:



Key Research Interests

- ERG - Bioremediation of toxic heavy metals using seaweed biomass; Environmental biomonitoring; Isolation of bioactive compounds from sustainable marine sources
- FRG - Wood energy; Vegetation management; Invasive species management; Traditional & novel control methods, including biological control
- MERG - Development of DNA identification techniques for mammals; Population analysis of Pine Martins in Ireland
- SARG - Biofuel research; Agri-environmental management

Contacts:
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Health Informatics Research Group - HIRG

The Health Informatics Research Group (HIRG) was set up in 2007 by a group of researchers in the Dept. of Computing, Mathematics and Physics and the Dept. of Nursing. Health Informatics is the intersection of information science, computer science and health science. The departments of CMP and Nursing have an ideal research and teaching mix to take advantage of this growing sector in RTD. The research centre encompasses expertise in ICT, Data Security, Databases, eLearning, Multiple Intelligence approaches, Hospital-at-home care delivery, and education.

Key Research Interests:

- Digital portals for healthcare services and delivery
- ICT support for health service personnel
- The use of online informatics to deliver education to healthcare personnel
- Data mining and security
- Use of ICT for health promotion

Application of research in an industry/societal context:
One of the aims of the HIRG is to extend the profile of health informatics at WIT into the region, and to form partnerships with health services and local industry. Many of the research areas we wish to develop have a potential commercial profile that would be attractive to both the public and private sector. e.g. the creation of digital portals to access health advice and services.

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Website: www.wit.ie/hirg

Macular Pigment Research Group - MPRG

The macular pigment research group (MPRG) was established in 2001. The MPRG is a multidisciplinary research group made up of biochemists, ophthalmologists, nutrition scientists, vision scientists, clinicians and statisticians. The goal of the MPRG is to investigate potential ways of preventing, or delaying, the onset of the world's leading cause of blindness age-related macular degeneration (AMD), with emphasis on the putative protective role of macular pigment in the prevention, delay, or modification of this disease, and also, its role in visual performance. The MPRG currently employs 13 researchers: 5 part-time and 8 full-time.
AMD is a disease of the macula, the central part of the retina, which results in loss of central vision. It is the leading cause of age-related blindness in the western world, and it is estimated that this disease affects approximately 80,000 people in the Republic of Ireland, and that a further 30,000 people may suffer unknowingly from it. The increasing worldwide prevalence of AMD is largely attributable to increasing longevity and lifestyle changes associated with western society. People with AMD lose their ability to read, recognise faces, watch television, drive, and therefore lose their independence and quality of life. It is predicted that the current AMD prevalence figures will double by 2020. In addition, the cost of vision loss and visual impairment to society and to health care providers continues to rise, with significant economic implications.

Current topics of research underway at the MPRG include:

- Nutrition and age-related macular degeneration
- Macular pigment and its association with risk factors for AMD
- Macular pigment and its association with known risk genes for age-related macular degeneration
- Macular pigment and its association with foveal architecture
- Macular pigment and its association with serum lipoprotein profile
- Macular pigment and its association with weight loss
- Macular pigment and its role in visual performance (COMPASS)
- Clinical trials involving macular carotenoid supplements in normal subjects and AMD patients (CARMA, COMPASS and MOST trials)
- Longitudinal investigation into macular pigment levels in an elderly Irish population (TILDA)

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Optics Research Group - ORG

The Optics Research Group (ORG) is a multi-disciplinary, multi-school group, based in the Department of Computing, Maths and Physics. Since its inception in 1994, it has played a significant role in the development of a broad research capability in WIT, contributing primarily in the area of optical science, with particular emphasis on telecommunications and sensing applications.

Initially, the research focus of the group was the development of interferometric techniques for the optical characterisation of transparent materials and interrogation of fiber Bragg gratings and other fiber optic components. In the years since, the skills base of the group has broadened to include many different branches of optical science; current projects range from discrete device fabrication, characterisation and analysis, to the design and testing of novel fibre optic systems.

Key Research Interests include:

- Solid-state photonic devices
- Nanophotonics & Biosensing
- Structural Health Monitoring
- Lasers and Spectroscopy
- Applied Mathematics

For additional information on group activities, recent publications, and positions vacant, visit our website or contact by email.

Contact:
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Website: www.wit.ie/org/

Automotive Control Group

The Automotive Control Group carries out research at Masters postgraduate level, with the current emphasis on the following topics:

- Distributed automotive control systems
- Vehicle Networks
- Diagnostics
- Telematics

This research is geared towards results with direct industrial application (applied research). Our primary aim is to provide our researchers with the real world skills that will enable them to secure employment as research and development engineers in the automotive industry. The main method for achieving this aim is to research relevant topics for current and future automotive applications. Many research ideas originate from our partners in the international automotive industry.

A number of undergraduate projects are also sponsored each year with the aim of supporting our primary research and discovering new areas of investigation.

Contact:
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Website: www.wit.ie/automotive

eLearning Technologies Research Group - WeLearnT

WeLearnT undertakes research into eLearning technologies, and the human computer interaction that takes place in an eLearning environment. Members of the group have also been responsible for developing the current WIT taught masters programme, Masters in Multimedia and eLearning, and are actively involved in the delivery of that programme. Postgraduate students in WeLearnT, at research Masters and PhD level, participate in research seminars and present their work at national and international conferences on eLearning. The interdisciplinary and interdepartmental aspects of our research experiences encompass the following aspects:

Key Research Interests

- ELearning Technologies and the online learning context
- Instructional Systems Design and the learning process
- The application of modern web technologies in support of learning, e.g., the study of the effectiveness of weblogs in an educational setting, support for the learning of mathematics and science, web support for learning disabilities
- The assessment of learning and reflection in the web-based context

Key thematic areas for postgraduate students

- ELearning and educational technology
- Multimedia applications in learning and eLearning
- Online learning standards, interoperability and standards bodies
- The use of ontologies and Topic Maps as representational structures in a web-based environment.

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Ms. Mary Barry E: mbarry@wit.ie
Website: www.wit.ie/welearnt

"My time as a postgrad at WIT has really broadened my horizons, not just in terms of the knowledge and skills I've gained but in terms of the places I've gotten to visit, the friends I've made and the wonderful experience I've had along the way."

Ray Caroll, PhD in Computing TSSG Research Group

Centre for Information Systems and Technoculture - INSYTE

The INSYTE Centre was established in 2001 and has a well-developed postgraduate programme at both Masters and PhD level. The centre also underpins a highly successful taught MSc programme in Information Systems Processes.

The centre is concerned with making information systems useful and appropriate for modern organisations and enabling technology-driven change.

INSYTE conducts research into a range of areas including:
- System Security
- Technology Leadership
- e-Privacy
- Cultural Issues in the Internet
- Suppy Chain Systems
- IT Education

Graduates have secured positions in academia and in the private sector, both in Ireland and abroad. Our researchers have included information systems professionals, senior managers as well as more traditional graduates of IT and business-related university-level programmes.

INSYTE focuses upon generating high quality publishable work and disseminates papers regularly in the leading international journals and conferences. INSYTE works with researchers across the world including the Europe Union, Eastern Europe, the Balkans, Asia, and North America.

If you are a graduate who has studied information systems at either bachelors or masters level, and you are interested in pursuing a research qualification in information systems please contact us.

Contacts:
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Centre for Scientific Computing - CSC

The Centre for Scientific Computing is a multi-disciplinary, multi-school research centre facilitating computationally-driven research, throughout the sciences and engineering. This is achieved by the sharing of expertise in computational methods and algorithms, encouraging the cross-fertilisation of ideas between researchers in the various disciplines, and enabling access to high-performance computing resources.

Key Research Interests:
- Algorithm design, with particular reference to grid computing
- Combinatorics
- Algorithms for Bioinformatics
- Algorithms for Financial Mathematics
- Computational Chemistry and Physics

Application of research in an industry/societal context:
One of the main aims of the CSC is the creation of sustainable high technology employment in the South East Region. It is engaged with local industry in a number of applied research projects. It is cooperating with universities in Ireland and internationally in running a one-week PhD Summer School twice a year in Scientific Computing.

Contact:
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Website: www.wit.ie/csc

"WIT has given me a wonderful opportunity to pursue research studies to doctorate level. Compared to undergraduate study, postgraduate study allows a greater focus on a specific topic and so is more challenging while also being enjoyable."

Qendresa Osmani, PhD in Science