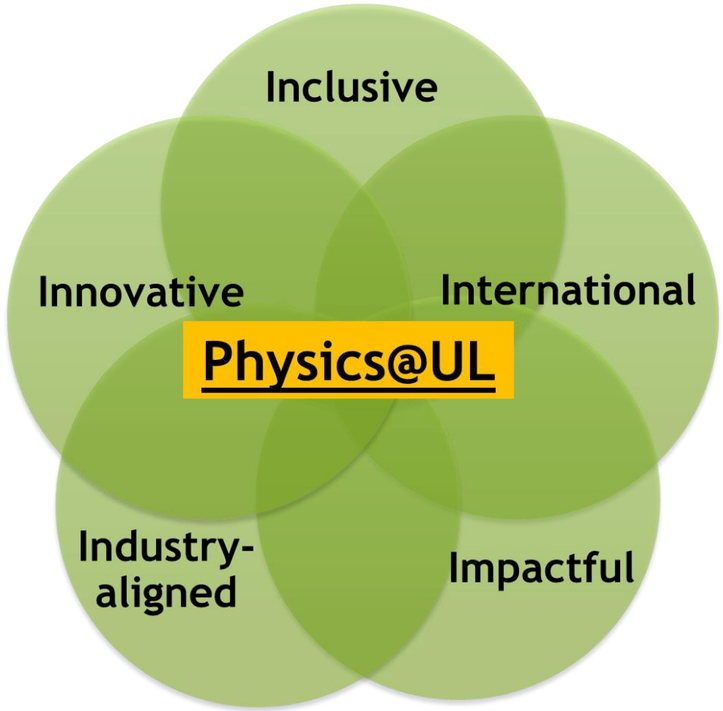
High Skilled Talent-Pool and Cutting-edge Research for Fundamentals and Industry

Professor Tofail Syed
Head, Department of Physics
University of Limerick, Ireland
June 2025
Tofail.Syed@ul.ie



IOP | Institute of Physics
Juno Champion

GENDER CHARTER
Athena SWAN Silver Award

UNIVERSITY OF LIMERICK
OLLSCOIL LUIMNIGH

Physics skills underpin productive employment and innovations in industry

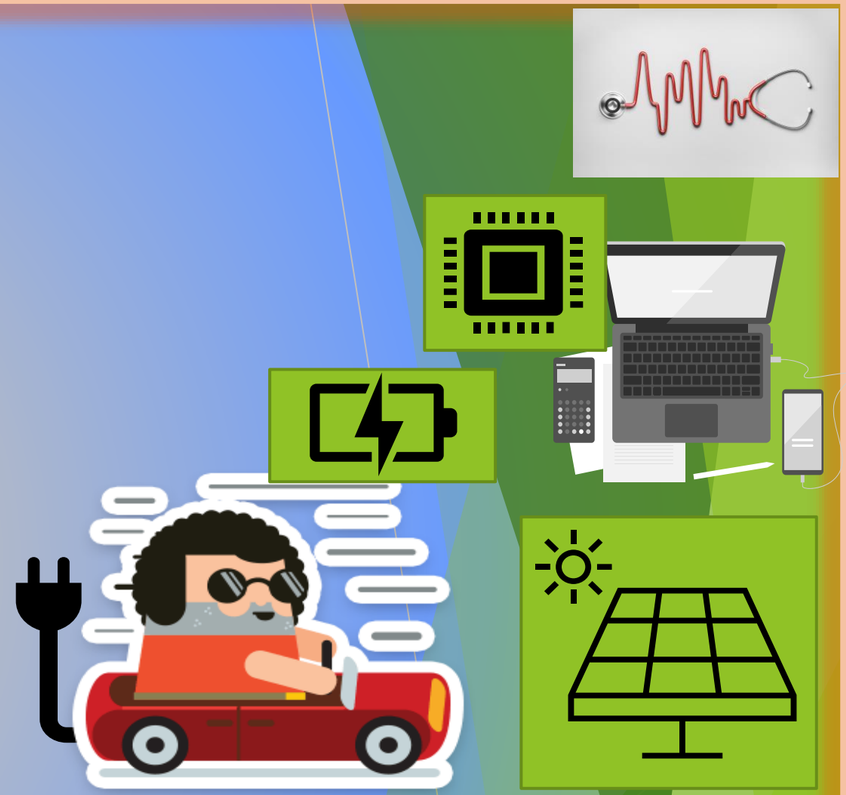
Enquiry and critical thinking



Effective skill development and problem solving



Enthusiastic adaptation of transferable skills to real life



- **Fastest growth in physics jobs in Ireland: 45% between 2010 and 2020***
- **Physics@UL graduates are on high demand in industry: ~100% employment**
- **Powering industry with high-skill labour across high-tech sectors:**
  manufacturing, engineering, semiconductors, ICT, sensors, medical devices, EV, AI, data analytics, instrumentation, operation, processes, health and so on
- **Graduate employment in high-paid jobs with better prospect in career progress**
- **2 (1) years' work visa for international students after full tuition postgraduation (graduation)**

**IOP 2022: Unlocking the potential of physics skills in the UK and Ireland*

Physics@ Ul leads Research, Innovation and Talent Growth in Ireland

- Cutting edge research in **fundamental and applied physics and engineering**

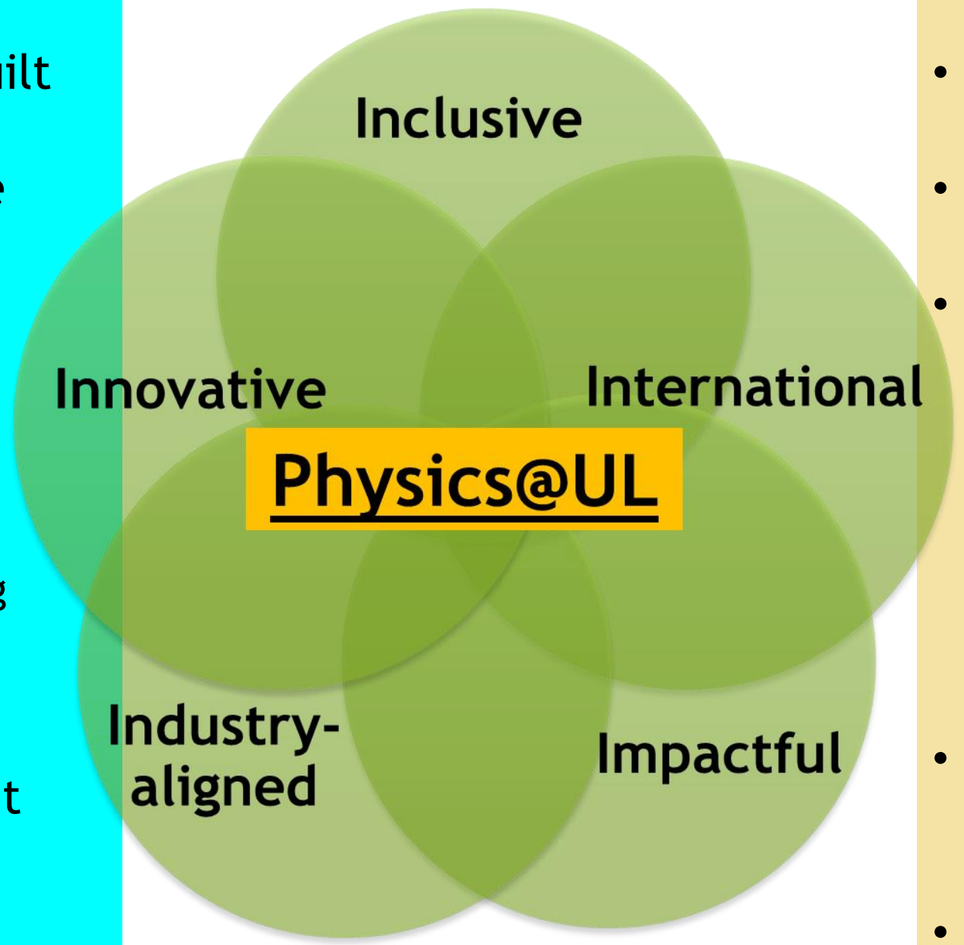
- State of the art and custom built materials processing and characterisation infrastructure

- International leader in Biopiezoelectrics
- National leader in:

  surface and interface analysis
  microscopy, spectroscopy & imaging
  materials design

- Industry-led and Industry-supporting research with talent pipeline

- Innovative, Inclusive, International, and Impactful



- Teaches **applied physics**
(equivalent to engineering Physics or Industrial Physics)

- Near 100% employment of students

- **50% graduate employed as engineers**

- Employment in diverse industry:
  semiconductors and ICT
  medical devices and health,
  materials processing,
  instrumentation,
  photonics,
  magnetics
  data analysis, ML and AI

- Robust industry placement and talent pipeline

- Critical-thinking graduates with hands-on, problem solving skills

Ireland's leading Physics educator for industry placement, graduate employment and cutting-edge research collaboration

International Links



- One of the most internationally linked Physics Departments in Ireland
- Both academic and research link with international universities and industry
- Dual and joint programmes, Study abroad, Erasmus bilateral and international programmes
- Scholarships and Placements
- USA, Europe, UK, China, India, Pakistan, Bangladesh, Turkey….

Programmes

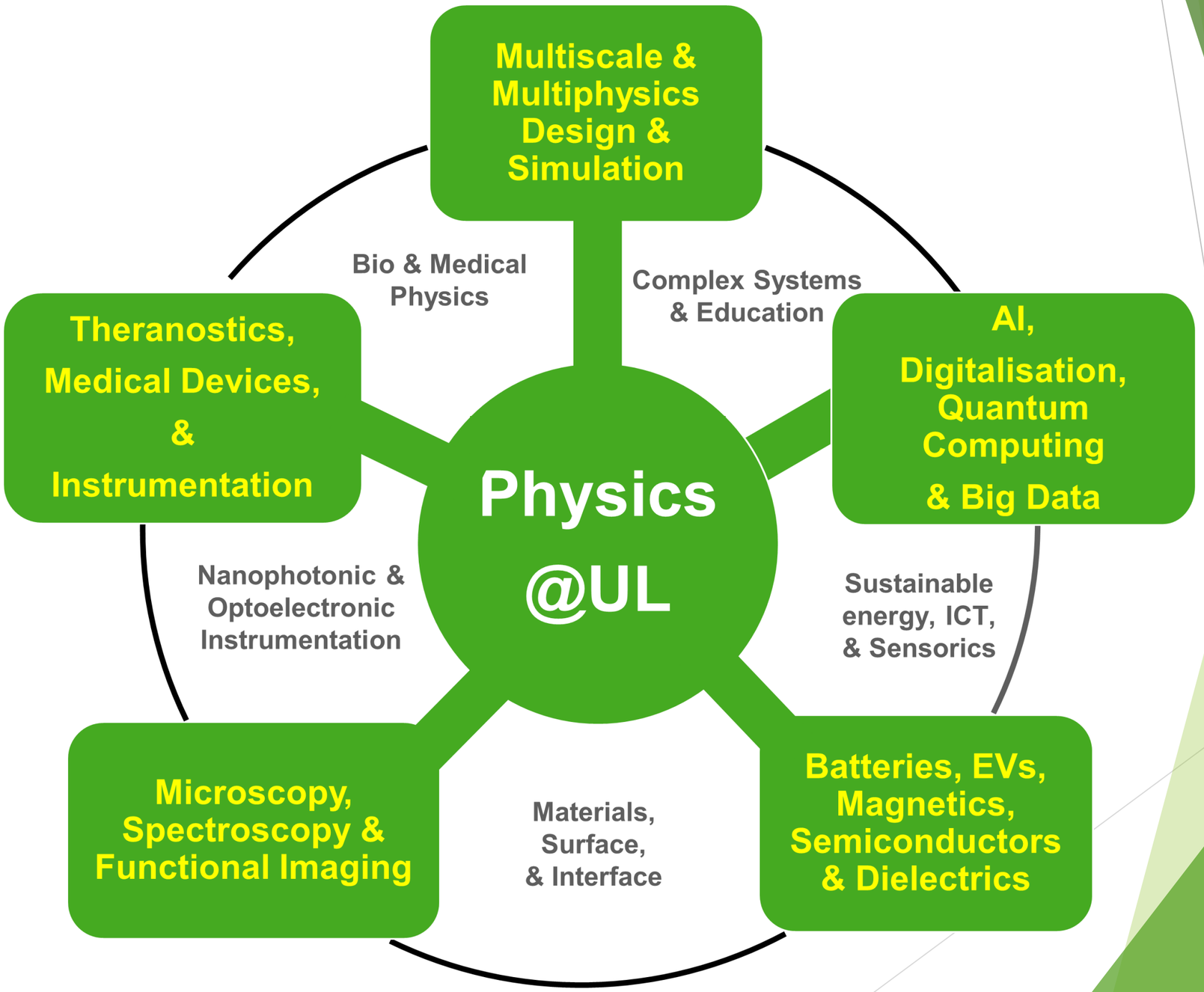
Industry Targeted Programmes

Programmes
Physics Common Entry BSc in Applied Physics BSc in Mathematics and Physics
MSc in Applied Physics (FT/PT) Professional Diploma in Applied Physics
MSc in Energy Science and Engineering Professional Diploma in Energy Science and Engineering (FT/PT)
MSc in Bioprocessing MSc in Biomolecular Science
BSc (Education) with concurrent Teacher Education (Physical Sciences with Chemistry AND Physics) (Biology and Chemistry OR Physics OR Agricultural Science)
Professional Diploma in Teaching Physics

Dual 0.5 +1 Link with BUET, BD and expanding 1+1 link with IIT, Bhillai in India and Symbiosis University in Mumbai, India

Programmes (Forthcoming)
MSc in Medical Physics (2026/27)
Erasmus Joint Masters in Emerging Materials and Devices (2027/28)
MSc in Astronautical Engineering *(proposed programme in development with School of Engineering)*

Research Themes



Outreach to promote Physics

SOPHia Physics – Science Outreach to Promote Physics

Contact: Ning.Liu@ul.ie; Maria.Quinn@ul.ie

Equality, Diversity and Inclusion



Athena Swan
Silver Award

First Silver Award Winner in the Republic of Ireland

IOP | Institute of Physics

Juno Champion

Undergraduate Programme (LM125)

Common Entry → **BSc in Applied Physics** *or* **BSc in Mathematics & Physics**

Minimum Entry Requirements:

Leaving Certificate (or ***equivalent pre-university certification and IELTS/equivalent English Proficiency for non-native speakers***) with a minimum of **6 subjects:**

- **Two H5** grades and **Four O6** grades or **Four H7** grades.
- Must have taken *Mathematics, Irish or another language, and English*.
- Must have **H4** grade **in Mathematics*** and **H4** grade **in** any one of the following:

  Physics, Applied Mathematics, Chemistry, Engineering, or Physics with Chemistry.

*Students not having achieved H4 in Mathematics in Leaving Certificate may be given another test by the Department

Co-Operative Placement

- **<u>Industrial experience</u>**
  - Students spend <u>8 months</u> on work placement with a related industry either in Ireland or abroad.
  - *<u>Placement takes place during the 2nd semester and 3rd semester of Year 3 of the 4 year-long UG course.</u>*
- **Research experience**
  - Students can also be placed in industrial or academic research settings during their co-operative education.
- **Erasmus / Study Abroad**
  - Students can study at other universities as their co-operative education.

What do they study?

Fundamentals

Measurement and Standards, Mechanics, Electricity, Magnetism, Energy, Thermal Physics, Oscillations, Waves, Light, Electromagnetism, Quantum Mechanics, Relativity, Nuclear Physics

Instrumentation for Measurement and Control

Optics, Lasers and Microscopy

Modelling and Engineering Mathematics

Materials, Semiconductors and Electrochemistry

Physics at Atomic and Nano Scales

BSc in **Applied Physics**

Specialisation in

Energy, Materials & Nature
Sensors & Devices,
Lasers, X-rays, HV &Instrumentation,
Waves & Matter,
Semiconductors & Dielectrics

Skills to

investigate
interpret
improve·
invent

What do they study?

Fundamentals

Measurement and Standards, Mechanics, Electricity, Magnetism, Energy, Thermal Physics, Oscillations, Waves, Light, Electromagnetism, Quantum Mechanics, Relativity, Nuclear Physics

Fundamental Mathematics

Linear algebra, Differential equations, Numerical methods, Probability

Imaging and Microscopy

Modelling of Physical Systems

Physics at Atomic and Nano Scales

BSc in **Maths & Physics**

Specialisation in

Modelling and Simulation
Data analytics,
AI & Machine Learning
Energy, Materials & Nature,
Waves & Matter,
Image processing and analysis

Skills to

investigate
interpret
improve
invent

Research Experience: Final Year Projects (2 Semesters)

1. Internal Projects:

- Students do research on a Final Year Project that is on a list of projects that is sent during the Summer and before the next academic year. Students speak to the lecturers in the Physics Department before choosing these projects.

2. Self-Designed Projects:

- Students can design a project themselves and formally propose it. (Note: These projects are assessed for suitability and not all such projects are approved.) Students are encouraged to speak to their lecturers about this when designing such projects.

3. External Projects:

- Where students can design a project during their co-operative education placement and commence this project in 4th year with supervision from their coop supervisor and internal supervision from within the department. (Note: These projects are assessed for suitability and not all such projects are approved.)

Summer Bursaries:

Students from 1st and 2nd year UG can also receive
summer bursaries for further training and experience in research laboratories

External Projects for Industry to Engage

- ***Proposed by co-op students*** in collaboration with their industry supervisors.
- *Time to propose*: **Mid-July** to **Mid-August** of every year.
- *How*:
  Interested student will send email to the Department Coordinator (Lauraine.Howley@ul.ie) by email a proposal for external project copying the Department FYP coordinator (Ning.Liu@ul.ie) before **Mid-August**.
- Department assigns a suitable academic supervisor for the project.
- *Content of project proposal*:
  - the aims and objectives of the project;
  - an outline of the approach and experiments to be undertaken;
  - details of equipment (particularly equipment needed at UL);
  - details of proposed measurements, analysis and discussion;
  - and a breakdown of the workload, in terms of work conducted at the company/research institution and work conducted at UL.
  - **It is anticipated that External Projects will be of a non-proprietary nature and aimed at further skill and knowledge development of the student.**
  - Proprietary research can be built into MSc, PhD and Postdoctoral Research Programme.

Postgraduate Programmes

For further and interdisciplinary training or switching area of expertise for better job opportunities and satisfaction

UG in Physics, Chemistry, Engineering or any equivalent course & IELTS/equivalent proof of English Proficiency

*Bangladesh University of Engineering and Technology (BUET), Bangladesh since AY2024/25
Indian Institute of Technology (IIT), Bhillai, India, from AY2025/26

MSc in Applied Physics (90 ECTS, with thesis)

Postgraduate Diploma in Applied Physics (60 ECTS, No thesis)

MSc in Energy Science and Engineering (90 ECTS, with thesis)

Postgraduate Diploma in Energy Science and Engineering (60 ECTS, No thesis)

Dual MSc in Applied Physics with *strategic international academic partners** (*(*90 ECTS and *1 year in UL with thesis)*

MSc in Medical Physics (90 ECTS with thesis, *forthcoming) jointly with School of Medicine, UL and University Hospital, Limerick*

Erasmus Mundus Joint Master (2 year 120 ECTS EU funded Master with thesis, mobility, research and/or industrial placement, *forthcoming*)

together with FH-Muenster, Germany and Wroclaw University of Science and Technology, Poland; Comenius University of Bratislava, Slovakia, University of Limoges, France, Bangladesh University of Engineering and Technology (BUET), Bangladesh and Indian Institute of Technology, Madras (IIT,M), India and participating industrial partners.

What do they study

Semester 1		Semester 2			Semester 3	
PH6001	**Research Project 1**	**PH6002**	**Research Project 2**		**PH5097**	**Research Project 3**
PH6011	Experimental Design and Research Methodology	PH6032	Scientific Communication and Literature Review			
PH5041	Condensed Matter Physics 1	PH5042	Condensed Matter Physics 2			
PH5094	Nanoscience and Nanotechnology 1	PH5098	Nanoscience and Nanotechnology 2	materials		
PH5098	Semiconductor Processing 1	PH5092	Semiconductor Processing 2			
PH6071	Advanced Analysis of Materials 1	PH6072	Advanced Analysis of Materials 2			
PH5093	Physics of Advanced Metrology	PH6031	Physics of Medical Instrumentation	instruments		
PH6061	**Computational Methods in Physics**	**PH6042**	**Advanced Computational Methods in Physics**	data processing & modelling		
PH6081	**Earth and Atmospheric Science**	**PH6052**	**Advanced Energy Conversion and Storage**			
PH6021	**Predictive Biomolecular Modelling Tools**	**EE6452**	**Digital Control**			
PH5091	Physics of Materials	EE6642	Noise			

Internal, Self-Designed or External Projects

MSc in
Applied Physics
FT/PT
Further Specialisation in
Energy, Materials & Nature
Sensors & Devices,
Lasers, X-rays,
HV &Instrumentation,
Waves & Matter,
Semiconductors &
Dielectrics
Medical Devices
Skills to
investigate
interpret
improve·
invent &
research deeper

https://www.ul.ie/gps/course/applied-physics-msc#:~:text=The%20MSc%20Applied%20Physics%20is%20a%20calendar%20year,Analog%20Devices%2C%20COOK%20Medical%2C%20Intel%2C%20Seagate%20and%20BorgWarner.

Semester 1		Semester 2			Semester 3	
		PH6082	Energy Group Research Project		PH6013	Energy Summer Project
PH6011	Experimental Design and Research Methodology	PH6032	Scientific Communication and Literature Review			Internal, Self-Designed or External Projects
PH6081	Earth and Atmospheric Science	PH5092	Advanced Energy Conversion and Storage			
PH6091	Scalar and Vector Measurement and Analysis of Energy	PH6052	Physics of Solar and Nuclear Energy			
		PH6042	Advanced Computational Methods in Physics			
	Wind Ocean and Hydro		Electrical Machines			
	Electric Vehicles and Sustainable Transportation		Smart Demand Side Management			
	Modern Grids and Transmission of Power					
	Engineering for Net Zero Carbon					

What do they study

MSc in Energy Science & Engineering

FT/PT

Further Specialisation in

Energy, Materials & Nature
Sensors & Devices,
Lasers, X-rays,
HV &Instrumentation,
Waves & Matter,
Semiconductors &
Dielectrics
Medical Devices

Skills to

investigate
interpret
improve·
invent &
research deeper

https://www.ul.ie/gps/courses/Energy%20Science%20and%20Engineering%20-%20MSc

Research Projects in MSc Programmes

	semester 1		semester 2		semester 3	
Appl Physics	PH6001	Research Project 1	PH6002	Research Project 2	PH5097	Research Project 3
Energy Sc. & Eng.			PH6082	Energy Group Research Project	PH6013	Energy Summer Project

- Research project involves 1 day/week in Semester 1 (Autumn) and/or Semester 2 (Spring) and full-time research in Semester 3 (Summer). Research project in MSc Energy Science and Engineering starts in Spring.
- Research leads to a MSc thesis for the fulfilment of the MSc degree.
- Research takes place within a research group led by a staff member of the Department of Physics as the Supervisor. Alternatively, research can take place as a ***relevant placement*** with a local supervisor from industry along with a Member of the Department of Physics as the Supervisor. Department can circulate among students interest from industry partners and outline areas of research project.
- For placement and external industrial projects, arrangements must be in place by the student and **the industry partner** before the start of the academic year (usually May-August) and Department must be informed beforehand. Intellectual property agreement usually takes place between the student and the company.
- *1 year Full Time Research for Dual and Erasmus MSc programmes give scope for projects research and industry placement!*

- Contact: Applied Physics: Christophe.Silien@ul.ie
  Energy Science and Engineering: Robert.Lynch@ul.ie

Pragmatic, Cutting Edge, Skill-enhancing World-Class Research for Industry

Industry and International Research

Direct Funding:	*From Industry or Host Country*
Enterprise Ireland:	*Commercialisation Fund* *Proof of Concept,* *Technology Development and* *Innovation Partnership*
Research Ireland:	*Research Centre Spoke TP/Platform* *Industry Fellowships* *Postgrad and Postdoc Scholarships* *Individual Fellowships (FFP, CDA, PI)*
European Commission:	*Horizon Europe,* *Erasmus+* *Marie Curie & Others* *(Local and European industry partnership)*

Industry Research

- UL's leading department in Industry Collaboration
- Strong link with local industry: semiconductors, artificial intelligence, software, medical devices, manufacturing and supply chain, batteries, pharmaceuticals

- All academics in the department are research active and supervised multiple postgraduate students
- From fundamental science to practical applications: 1 spin out in antiviral/antibacterial textile coatings

- Power house of University's innovation and disruption:

  granted patents, invention disclosures and patent applications;
  25% publications in top 10% journals

- Led Ireland's largest Industry Spoke in a Science Foundation Ireland Research Centre
- Deep partnerships in research, education and student placement with US multinationals and local companies

- Leadership and expertise supports Bernal Institute's world-class national infrastructure in materials, surface and interface characterisation:

electron microscopy and nonlinear optical imaging, scanning probe microscopy, batteries and energy harvesting, medical imaging and devices, surface and interface analyses, sensors, actuators and intelligent device design and prototypes

Industry Engagement *Pipeline*

EU or Direct Industry Funding can hire at any level of career

				Dual MSc (1 + 1)		PhD			Postdoctoral/Research/Senior Research Fellow					
Undergraduate				MScPrD		PhD			Postdoctoral/Research/Senior Research Fellow					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Undergraduate				PhD			Postdoctoral/Research/Senior Research Fellow							

Plan Early, Win Early!!!

COOP Industry Placement

FYP

External Ind. Project

Dual MSc

Research Ireland MSc/PhD Open/Enterprise Partnership

Research Ireland Postdoctoral Fellowship Open/Enterprise Partnership
Research Ireland Industry Fellowship/ EU MSCA Fellowship

Research Ireland/Enterprise Ireland Collaborative Research Funding
Research Centres/Innovation Partnership

Industry sponsored research projects

Advanced Skills and Leadership



Scholarships/Bursaries for International Students

- EU and UK citizens pays same fees as Irish nationals
- Non-EU students enrolled in strategic dual degree partnership programmes receive bursaries in the form of partial waivers of non-EU fees
- Non-EU students receive special waivers of non-EU fees in competitive, externally funded PhD and Research Masters projects
- Non-EU students can also enrol in self-funded Master or PhD programmes by paying non-EU tuition fees
- Further information on fees can be found from https://www.ul.ie/fees/course-fees

Thank you!

Further Queries: Tofail.Syed@ul.ie

UNIVERSITY OF LIMERICK
OLLSCOIL LUIMNIGH

University of Limerick,
Limerick, V94 T9PX,
Ireland.

Ollscoil Luimnigh,
Luimneach,
V94 T9PX, Éire.

+353 (0) 61 202020

ul.ie