



Waterford Institute  
of Technology



Waterford  
engineeringweek

**February 27th  
- March 4th 2012**

## Engineering Week Programme 2012

In the current economic difficulties WIT has endeavoured to keep events free of charge. However booking must be made for all events with Catriona Carroll WIT School of Engineering at

[cbcarroll@wit.ie](mailto:cbcarroll@wit.ie) or 051 30 2613

Further details see [www.calmast.ie](http://www.calmast.ie)

### Interactive Presentations at Waterford Institute of Technology

#### From Newgrange to the New Bridge – the Story of Irish Engineering

The story of Irish engineering is told through richly illustrated pictures of well known structures, tracing the development of building with the developments of new engineering technologies such as the arch, concrete, steel and reinforced concrete. In the presentation practical demonstrations will show how forces act and how different materials behave in different manners and the audience will learn how structures that they are familiar with actually work. The presenter, Eoin Gill is an energy and environmental engineering lecturer at WIT and a director of Calmast, Ireland's leading STEM (science, technology, engineering and maths) outreach centre at WIT. He has addressed thousands of pupils in the Southeast in various STEM shows and has been the recipient of several international and national awards for science communication.

Audience	Primary 4 <sup>th</sup> – 6 <sup>th</sup> Class.
Presenter	Eoin Gill
Time	12 pm
Date	Monday 27 <sup>th</sup> February

#### What use is Maths?

This is a question often asked by pupils. This presentation will answer this question by showing real life applications of Junior Cert Maths including examining how fundamental errors lead to the tragic destruction of the space shuttle. The aim of the talk is to let Junior Cycle students see how important and useful maths is and thus improve their attitudes towards maths and motivate them in their studies. The presenter Dr Padraig Kirwan established the Maths Learning Centre at WIT and is one of Ireland's leading maths popularisation lecturers and has given presentations all around Ireland.

Audience	Junior Cycle
Presenter	Dr Padraig Kirwan
Time	12:45 – 13:45
Date	Monday 27 <sup>th</sup> February

#### The Life and Works of Robert Boyle

Robert Boyle is Ireland's most famous scientist and was born in Lismore in 1627. He made fundamental discoveries in chemistry and physics – things that are considered so fundamental nowadays that their discoverer is often overlooked. He is however still known around the world as the father of chemistry and the first fundamental gas law Boyle's Law bears his name. This interactive presentation recounts Boyle's fascinating life and recreates his most famous experiments. The audience will learn about the seventeenth century world view and how modern science developed and the presenter will argue that Robert Boyle has had more influence over the course of human history than any other Irishman. The presenter, Eoin Gill is an energy and environmental engineering lecturer at WIT and a director of Calmast, Ireland's leading STEM (science, technology, engineering and maths) outreach centre at WIT. He has addressed thousands of pupils in the Southeast in various STEM shows and has been the recipient of several international and national awards for science communication.

Audience	Primary 5 <sup>th</sup> & 6 <sup>th</sup> Class
Presenter	Eoin Gill
Time	10 am
Date	Tuesday 28 <sup>th</sup> February

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### Boyle's Law - 350<sup>th</sup> Anniversary

Boyle's Law was first published by Robert Boyle in 1662. This is one of the fundamental laws of science and is learned by students around the world. Robert Boyle is Ireland's most famous scientist and was born in Lismore in 1627. He made fundamental discoveries in chemistry and physics – things that are considered so fundamental nowadays that their discoverer is often overlooked. He is however still known around the World as the father of chemistry and the first fundamental gas law Boyle's Law bears his name. The story of the discovery of the law will be told including the shocking truth that Boyle himself didn't discover it! This interactive presentation will put leaving certificate physics and chemistry in a historical context and also recount Boyle's fascinating life and recreate many of his most famous experiments including a demonstration of Boyle's Law itself. The audience will also learn about the seventeenth century world view and how modern science developed and the presenter will argue that Robert Boyle has had more influence over the course of human history than any other Irishman. Eoin Gill has presented shows on Boyle across Ireland, the UK and several EU countries and as far away as Korea.

Audience	TY 5 <sup>th</sup> & 6 <sup>th</sup> Year
Presenter	Eoin Gill
Time	12 pm
Date	Tuesday 28 <sup>th</sup> February

### Station X: The Battle of the Atlantic, Secret Codes and an Early Computer

This talk looks at how Nazi submarines controlled the Atlantic in WW2 and how the Allies fought a new type of battle - information warfare lead by amazing people such as Alan Turing.

WIT lecturer Rob O'Connor will bring alive this exciting story of warfare, espionage and the early development of computers.

About the Speaker- Rob O'Connor is the course leader for the BSc (Hons) in Entertainment Systems at WIT, a well-known Waterford musician and also the presenter of Irish Beats on Beat 102-103FM.

Audience	Junior Cert.
Presenter	Rob O'Connor
Time	11:30 – 12:30
Date	Wednesday 29 <sup>th</sup> February

### Introducing Integration using the Monte Carlo Method RDS Bursary Lecture

Integral calculus is a very important mathematical tool for engineering and many other areas. However, it can be a difficult concept for students and often students can "learn" calculus without developing an intuition for the topic. This demonstration lecture will introduce integration using the using statistical techniques, including the 'Monte Carlo' approach, in a highly interactive and physical context. Students with different learning styles are expected to respond well to the demonstration and empirical approach in this presentation. This lecture is highly relevant to the Leaving Certificate Project Maths syllabus. It also offers an opportunity to outline how computers actually use integration for real world problems. Presenter, Michael McCarthy is a lecturer in Electronic Engineering at WIT and has previously worked for some of the world's leading electronic companies. He is in regular demand nationwide for engineering, maths and science talks. He was awarded an RDS science bursary in 2011 to develop this presentation and has previously delivered it at the RDS and Engineers Ireland headquarters.

Audience	Leaving Cert.(5 <sup>th</sup> & 6 <sup>th</sup> Years)
Presenter	Michael McCarthy
Time	13:15 – 14:15
Date	Wednesday 29 <sup>th</sup> February

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### Electricity – the Irish Connection

Rev Nicholas Callan (1799 – 1864) was professor of natural philosophy in Maynooth. Despite his seeming isolation from the scientific centres of the world he managed to construct the world's most powerful electromagnet at Maynooth and also the largest electrical supply. However, his greatest discovery was the induction coil since used to power spark plugs in all petrol engines and also the forerunner of the electrical transformer. Callan had a very interesting way of testing the strength of his electricity on students but was an extremely charitable man. This demonstration lecture will tell the story of his life and times, of the early fundamental discoveries in electricity and bring to life Callan's own discoveries. Students will also learn about how this tradition was continued by other Irish scientists and engineers. Three prominent presenters will team up to illuminate these aspects of Nicholas Callan– Sheila Donegan, chemistry lecturer, director of Calmast and collateral descendant of Callan, Michael McCarthy, electronic engineering lecturer and Eoin Gill, Calmast director and energy and environmental engineering lecturer.

Audience	TY & Leaving Cert.
Presenter	Sheila Donegan, Eoin Gill, Michael McCarthy
Time	9:45 – 10:45
Date	Thursday 1 <sup>st</sup> March

### ENGINEERING QUIZ

The WIT Engineering Quiz is a fun quiz based on STEM - Science, Technology, Engineering, Maths and General Knowledge. The quiz highlights the skills required to be an engineer (with rounds on science, maths etc.) and the structure of the event will ensure your pupils will have an enjoyable experience. The event will also provide information on engineering careers in general. The level of the Maths and Science questions will be appropriate to students who have completed the Junior Cert syllabus. Places are limited to 20 teams of four. Prizes will be awarded for 1st, 2nd and 3rd place and there will also be spot prizes. Teams of four from 5<sup>th</sup> year or transition year are invited to participate.

Audience	TY & 5 <sup>th</sup> Years
Quiz Coordinator	Siobhan Wall
Course Leader in Electrical Systems Engineering.	
Time	11:30 – 14:30
Date	Thursday 1 <sup>st</sup> March

### Energy and Climate Change

It is now widely accepted that our reliance on oil and gas is undesirable for security, economic and environmental reasons. Just how can we manage our energy and where will we get our energy from in the future. In this demonstration lecture Eoin Gill will address the issues that will impact largely on our young people's lives and examine the technologies that may provide solutions. The presenter, Eoin Gill is an energy and environmental engineering lecturer at WIT and a director of Calmast, Ireland's leading STEM (science, technology, engineering and maths) outreach centre at WIT. He has addressed thousands of pupils in the Southeast in various STEM shows and has been the recipient of several international and national awards for science communication.

Audience	Primary
Presenter	Eoin Gill
Time	10:00 – 11:00
Date	Friday 2nd March

### Feel the Heat

We all think we know about heat. But with a few simple questions we can realise that it's not as simple as we think. This interactive presentation will examine heat as a form of energy, its importance to our lives how we produce it from fuels and mechanical energy and how in turn we use heat to create mechanical energy in engines and subsequently electricity – all with reference to the Junior Cert curriculum. There will be lots of demonstrations and participation and also issues of civic responsibilities and some philosophy and history thrown in for good measure. The presenter, Eoin Gill is an energy and environmental engineering lecturer at WIT and a director of Calmast, Ireland's leading STEM (science, technology, engineering and maths) outreach centre at WIT. He has addressed thousands of pupils in the Southeast in various STEM shows and has been the recipient of several international and national awards for science communication.

Audience	Junior Cert
Presenter	Eoin Gill
Time	12:00 – 13:00
Date	Friday 2nd March

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## **Workshops – A maximum group size of 30 except where otherwise stated**

### **Electric Motor – Make and Take**

In this popular workshop participants learn about electric motors the most effective way – by making one that they can take home with them! They also learn about electricity, electro-magnetic induction and building circuits. The workshop has been presented to groups from primary 4<sup>th</sup> class up to adult, each time tailored for the specific audience level.

### **Structures**

In this workshop participants are introduced to the engineering of structures, which involves consideration of materials, strength of those materials and the forces acting on them. Participants will be challenged to build certain structures using various materials – paper, straws, spaghetti and K<sup>o</sup>nex – the challenges and materials used will be tailored to suit the level of the participants. These activities can be continued in the classroom or at home and will encourage the participants to figure out how buildings actually perform their functions.

### **Energy and Forces**

This workshop explores the fundamentals of forces (Newton's First and Second laws) and investigates how we convert from one type of energy to another to do useful work. Participants will experiment for themselves with rockets and other fun activities.

### **Electronics Club**

A variety of simple circuits will be constructed by participants, who will learn about the fundamentals of circuits and how we get electricity performing all the useful functions we depend on. They will also get an overview of how complex electronic devices such as mobile phone work.

### **Robots and Electronic Music**

This special 3-hour workshop package for Transition Years is limited to a group of 24. The group will be split in half and each group will do two workshops. Participants will be introduced to real working robots and then programme robots to perform tasks. In the other workshop participants will make one of the most unusual of musical instruments – a Theremin – which was one of the first electronic instruments.

### **Squishy Circuits**

A fun way to learn about electrical circuits using dough! Two doughs are used, one is made to be conducting and the other non-conducting. These are used instead of wires and require no connectors and will be used to make a variety of simple circuits. Suitable for primary schools from 3<sup>rd</sup> Class up.

### **Materials Testing**

The properties of materials are very important in engineering and engineers must test both raw materials and products in manufacturing. In this workshop participants will learn about materials and do real testing at the WIT materials testing laboratory. Through this they will also get a taste of the coursework of a WIT engineering student. Suitable only for Leaving Cert/ Engineering PLC group.

### **Pneumatics**

The power of air is used widely in industry to perform operations on a manufacturing line. Participants will get to assemble pneumatic circuits and test them in the pneumatics laboratory. Through this they will also get a taste of the coursework of a WIT engineering student. Suitable only for Leaving Cert/ Engineering PLC group.

### **Electrical Engineering**

Participants will learn about using electricity to power machines. They will learn how industrial motors are used and they will get to "make and take" an electric motor individually. Through this they will also get a taste of the coursework of a WIT engineering student. Suitable only for Leaving Cert/ Engineering PLC group.

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## About Engineering at WIT

Waterford Institute of Technology has a long tradition of engineering education producing engineers and engineering technicians for industry in the Southeast, throughout Ireland and around the world. The presence of a successful engineering school is a major factor in attracting and maintaining industry in the region.

Courses are offered in the main disciplines of engineering: electronic, electrical, mechanical, manufacturing and civil, with specialist courses also available in building services engineering and sustainable energy engineering. Direct entry is available to courses from level 6 (Higher Certificate) to 8 (Honours Degree) and progression is possible all the way to PhD. WIT also offers courses in related disciplines in construction, computing and science.

For more information see:

[www.wit.ie/SchoolsDepartments/SchoolofEngineering](http://www.wit.ie/SchoolsDepartments/SchoolofEngineering)

## About Calmast



Waterford Engineering Week is coordinated by Calmast WIT's award winning STEM (science, technology, engineering and maths) outreach centre. Calmast is working with the local authorities and other bodies to create a European science region. The centre was established to coordinate all outreach activity in these areas and has become the most successful centre of its kind in Ireland. There are 2,000 places available in Engineering Week 2012 and it is only one of several events serving schools in the Southeast offered annually. Scifest Waterford will run on the 25<sup>th</sup> April offering secondary schools the opportunity of exhibiting projects where the emphasis is on participation rather than competition. The Bealtaine Festival of Outdoor Science celebrates our living earth every May (19<sup>th</sup> – 27<sup>th</sup> in 2012) and includes International Day for Biological Diversity (May 22<sup>nd</sup>). Local authorities, government agencies and NGOs work together to introduce participants to the natural heritage of the Southeast region. It was listed in the Guardian's list of the top 10 events in the world for Biological Diversity Day in International Year of Biodiversity in 2010. ([www.livingearth.ie](http://www.livingearth.ie)).

Waterford Science Week takes place in November when top international and national scientists and science presenters join local presenters in bringing all areas of science alive for all ages. Events are also held in towns around the region. Typically the festival would offer over 60 sessions and cater for over 7,000 participants. Maths Week Ireland is Ireland's largest STEM festival (participation in 2011 in excess of 120,000) and the leading festival of its kind in the world. It was established and is coordinated by Calmast and is a cooperative effort with partners all across Ireland. It will run in 2012 from 13<sup>th</sup> – 21<sup>st</sup> October. (see [www.mathsweek.ie](http://www.mathsweek.ie)). As 2012 sees Dublin crowned European City of Science Calmast will be engaged in several extra initiatives in Dublin this summer to bring STEM to thousands of visiting scientists and the public. Calmast was also a key player in the establishment and delivery of the first Robert Boyle Festival in Lismore in 2011. Now the centre is working on the creation of Ireland's first science summer school– the Robert Boyle Summer School in Lismore in July. The centre has won several awards regional, national and international including being the only Irish recipients of the Descartes Prize, the prestigious EU award for Science Communication.

More information: [www.calmast.ie](http://www.calmast.ie).



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