Electives Offered by Department of Mathematics
Semester 2, 2013/14

MATH6028 *Mathematical Explorations*

CRN: 13968

This module explores how Mathematics is intrinsically linked to the world around us.

Among the many topics covered are:

- Construction of Ratios, Circles and Numbers
- Problem Solving involving Logical thinking
- Study of Famous numbers like π and *e*
- Maths in Games and Puzzles
- Use of Maple and Geogebra to explore Mathematical things

The module is fun and hopes to take advantage of the participant's innate passion for things mathematical. The student must to be willing to actively engage and participate through the weekly labs to make the most of the module.

For further information, please contact Dr Michael Brennan (michael.brennan@cit.ie) or Dr Áine Ní Shé (aine.nishe@cit.ie)

Times: Tue @ 12:00 in E7, Wed @ 14:00-16:00 in C125, Fri @ 12:00 in B219

MATH6050 *Mathematics & Music 1*

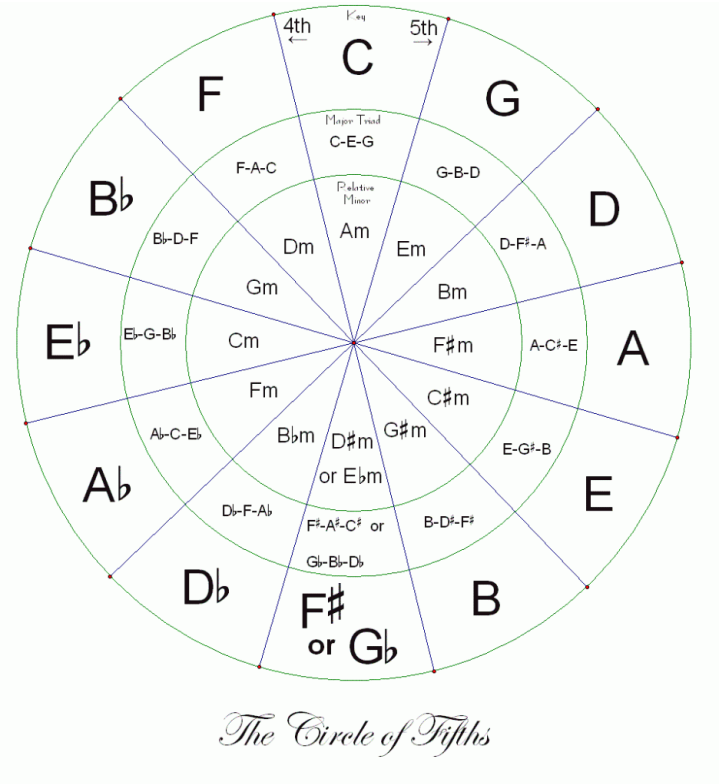
CRN: 24564; contact pat.ahern@cit.ie or aine.nishe@cit.ie

This module is an exploration of some of the many links between Mathematics and Music.

Among the many topics covered are:

- horizontal and vertical structures in music
- mathematical waveforms and their relationship to musical sound
- tuning methodologies including the placement of guitar frets
- the relationship between analogue sounds and their digital counterparts
- algorithmic methods of composition.

You'll need a good knowledge of basic mathematics and a basic knowledge of music theory.



For further information, please contact Mr Pat Ahern (pat.ahern@cit.ie) or Dr Áine Ní Shé (aine.nishe@cit.ie)

Provisional Times: Tue @12:00; Wed @14:00-16:00; Thurs @14:00

MATH6019
Technological Maths 2 & Maple

CRN: 24563

This module is an introduction to calculus, the branch of Mathematics that allows us to progress from still pictures to moving pictures and to answer such questions as: *If I kick a ball in the air, how high will it go? How long will it take to come back down? What's the best design for a 400 m running track?*

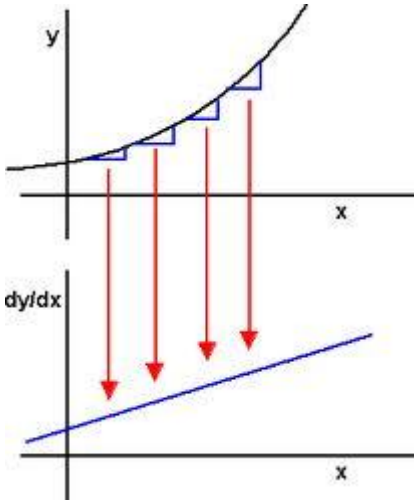
Each topic in the module is presented from three viewpoints:

- Why do we do it?
- How do we do it?
- What do we use it for?

The ideas in the module are explored using mathematical software such as Maple and GeoGebra.

Among the topics covered are:

- Differentiation and its applications to rates of change and optimisation problems.
- Integration and its applications to areas and volumes.
- Differential equations and the answer to the question: *How long does it take a kettle to boil?*



For further information, please contact Mr Pat Ahern (pat.ahern@cit.ie) or Dr Áine Ní Shé (aine.nishe@cit.ie)

Times will be arranged depending on student demand.

MATH8010 *Multivariable Calculus*

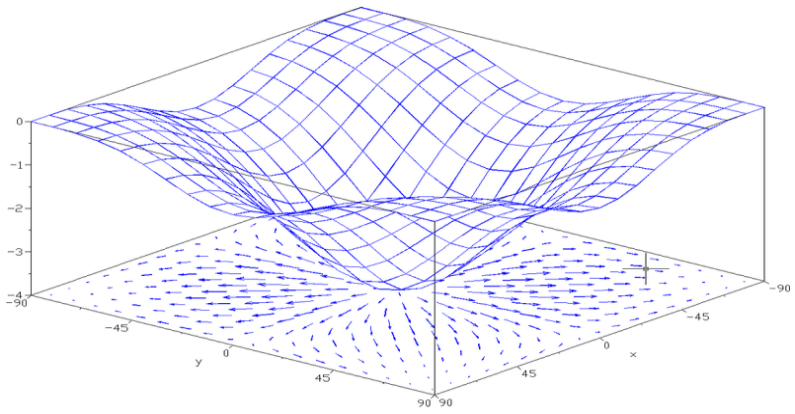
CRN: 24255; contact sean.lacey@cit.ie or aine.nishe@cit.ie

This module provides methods to visualise and compute three dimensional structures along with applying techniques of vector calculus to engineering problems.

Among the many topics covered are:

- Geometric representation of vector functions;
- Evaluation of line, surface and volume integrals of scalar fields based on physical applications (Ampere's law, Faraday's law, Maxwell's equation etc.);
- Analytically and numerically solving 2nd order partial differential equations (pde);
- Demonstration on how pde's can be used to solve the electromagnetic wave equation, transmission line equations, and electrostatic potential problems.

This is an advanced mathematics module. Students should have prior learning of the following topics:
Differentiation; Integration; Ordinary differential equations; Basic partial differentiation.



If you are interested in taking this elective, please contact Dr Seán Lacey (sean.lacey@cit.ie) or Dr Áine Ní Shé (aine.nishe@cit.ie) in the first instance for further information on the module, including times.

DATA8001 *Data Science and Analytics*

CRN: 24010

This module is an introduction to exciting and new area of Data Science and Analytics.

Some of the topics and areas of interest that will be explored are:-

- big data and how to 'mine' this information

- data in society - NSA, Edward Snowdon and data protection/privacy

- mathematics and the computer science 'algorithms' that help us find insights and patterns in the data

- build a number of data analytics models using open source software and use them to solve problems

No prior modules are necessary but a knowledge of the basics of mathematics and computer science is required, and an interest in problem solving would be great. Ideally, given that the module is at advanced level, you should be in Year 3 or Year 4 of a Level 8 programme, *or* have a HC3 / OA2 grade in Leaving Certificate Maths or Applied Maths.

If you are interested in taking this elective, please contact Mr Aengus Daly (aengus.dal y@cit.ie) or Dr Áine Ní Shé (aine.nishe@cit.ie) for further information, including times.