

## Curriculum Vitae - Eoghan Staunton

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### Education & Academic Achievements

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#### **Education**

- **Oct 2015 – Oct 2019:** NUI Galway – PhD. Applied Mathematics.
- **Sep 2013 – May 2015:** NUI Galway – Research MSc. Applied Mathematics.
- **Sep 2009 – May 2013:** NUI Galway – BSc. Financial Mathematics and Economics: First class honours-91.58%.
- **Sep 2009 – May 2011:** NUI Galway - Dioplóma sa Ghaeilge (C1): First class honours-77.00%.
- **Sep 2003 – Jun 2009:** Coláiste Iognáid – Leaving Certificate: 6 Higher Level A1s (Maximum CAO points).

#### **Academic Scholarships and Prizes**

- **2015-2019:** Government of Ireland Postgraduate Scholarship from the Irish Research Council
- **2015-2019:** Hardiman PhD Scholarship from NUI Galway (declined in favour of IRC award)
- **2017:** First Prize Research Poster at the University of Limerick – NUI Galway 4<sup>th</sup> Postgraduate Research Day
- **2017:** First Prize Research Poster at the NUI Galway School of Mathematics Research Day
- **2013-2015:** Research MSc. Scholarship in Applied Mathematics from NUI Galway
- **2014:** Thesis in Three runner up at the University of Limerick – NUI Galway 4<sup>th</sup> Postgraduate Research Day
- **2013:** First Derivatives Best In Class Award – Financial Mathematics and Economics, NUI Galway
- **2012:** Hamilton Prize from The Royal Irish Academy
- **2010, 2011 & 2012:** University Scholar Awards from NUI Galway
- **2009:** Academic Entrance Scholarship from NUI Galway
- **2006-2007:** Invited to attend the PRISM mathematical enrichment course in NUIG.

### Research Experience

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#### **Oct 2015 – Present:** PhD. Applied Mathematics - *Nonsmooth Dynamical Systems with Noise*

Historically mathematicians and scientists have made widespread use of smooth, deterministic mathematical models to describe real-world phenomena. These models present a simplified view of the world where, on one hand, the evolution of systems is always smooth and exhibits no interruptions such as impacts, switches, slides or jumps and, on the other hand, the future of any system is completely determined by its present state. However, when modelling many systems one or both of these simplifications may not hold. For example, mechanical systems involving impacts or friction behave in a nonsmooth manner and it has been shown that a level of randomness or noise is ubiquitous in real-world systems. Independently, both noise and nonsmoothness have been shown to be the drivers of significant changes in qualitative behaviour. My research investigates systems which are simultaneously both nonsmooth and noisy.

**Supervisor:** Dr. Petri Piiroinen, School of Mathematics, Statistics and Applied Mathematics, NUIG.

#### **Sep 2013 – May 2015:** Research MSc. Thesis - *Dynamic Spatial Networks & Economic Development*

Spatial agglomeration of economic activities and unequal growth of urban centres are a major topic of economic interest. The aim of this project was to model and analyse these uneven spatial economic dynamics. We did this by setting up an agent-based simulation environment composed of multiple overlapping networks across space and time. We are currently preparing two articles for publication based on this research.

**Supervisors:** Dr. Petri Piiroinen, School of Mathematics, Statistics and Applied Mathematics, NUIG.

Dr. Srinivas Raghavendra, College of Business, Public Policy and Law, NUIG.

Dr. Jim Duggan, College of Engineering and Informatics, NUIG.

#### **Academic Year 2013:** Final Year Project - *Infinitesimals, Nonstandard Analysis and Applications to Finance*

An infinitesimal is a number that is smaller in magnitude than every positive real number. We learn early on in our study of standard analysis that nonzero infinitesimals cannot exist. It is also true however that many people use the intuitive notion when trying to understand basic concepts in analysis and calculus such as derivatives or integrals. In this project we introduced the reader to the world of nonstandard analysis, a world in which infinitesimals exist, in a rigorous but accessible manner.

**Supervisor:** Dr. Raymond Ryan, School of Mathematics, Statistics and Applied Mathematics, NUIG.

#### **Summer 2012:** Intern at the School of Mathematics, Statistics and Applied Mathematics, NUI Galway

We carried out a research into the phenomenon of multiple conjugate points along a geodesic. We investigated conjugate points in the context of the Jacobi equation, a second order ordinary differential equation, which captures precisely the geometry of conjugate points on surfaces.

**Supervisor:** Dr. John Burns, School of Mathematics, Statistics and Applied Mathematics, NUIG.

### Presentations of my Research

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#### **Publication**

J.M. Burns, E. Staunton, D.J. Wraith, On the Jacobi Equation and Manifolds with Multiple Conjugate Points, *Mathematical Proceedings of the Royal Irish Academy*, 113(1):19-30, 2013

### Research Talks

- NUI Galway Modelling Research Group , NUIG, Sep 2013 – Present
- SIAM National Student Conference 2016, UL, Dec 7 2016
- NUI Galway - UL Alliance Postgraduate Research Day, UL, 20 May 2014
- Ways of seeing: Multidisciplinary workshop on data visualization and analysis, NUIG, Apr 23 - 25 2014

### Poster Presentations

- Irish Applied Mathematics Research Students' Meeting, NUIG, December 11 2014
- NUI Galway - UL Alliance Postgraduate Research Day, UL, May 20 2014
- Research Day, School of Mathematics, Statistics and Applied Mathematics, NUIG, May 1 2014
- AHSSRB Opening, Social Sciences Computing Hub, NUIG, May 1 2014

## Work Experience and Community Involvement in Mathematics and Applied Mathematics

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### ***NUI Galway Society for Industrial and Applied Mathematics Chapter (2014-Present)***

- I am a founding member and the current secretary of Ireland's first SIAM student chapter.
- I have been involved in organising several events with the chapter including postgraduate conferences in 2014 & 2015 and annual Research Blitz Talks for Undergraduate Students. A comprehensive list of events organised by the chapter so far is available here: <http://www.maths.nuigalway.ie/SIAM-Galway/events/>.
- This year I am on the organising committee of the 6th National Student Chapter Conference of the UKIE Section of SIAM.

### ***NUI Galway Postgraduate Modelling Research Group (2015-Present)***

- I am the auditor of the NUIG Postgraduate Modelling Research Group.
- Each week I organise a seminar with two presentations by current NUI Galway PhD students or a single presentation by an external guest speaker.

### ***Education & Teaching (2010-Present)***

- **Summer 2015:** Mentor and Organiser for the Stokes Undergraduate Modelling Workshop, NUI Galway  
I worked to promote and organise this four day undergraduate modelling workshop. The workshop's format was loosely based on the Mathematical Contest in Modelling, with training and small group study sessions provided by lecturers and postgraduate students. During the workshop I mentored a group of five undergraduates modelling the spread of infectious diseases in human populations.
- **2013-Present:** Mathematics Tutor at NUI Galway  
I have worked as a tutor for many mathematics, applied mathematics and statistics modules at NUI Galway including MA109, MA140, MA161, ST237, MP211, MP305, MP307, MP491 and MA342.
- **2010-Present:** Grinds Teacher.  
I work independently tutoring mathematics students of all levels. During the academic year 2010 I was also employed at the Grinds Academy, Oranmore, Galway, teaching mathematics and physics classes.
- **Summer 2011:** Intern at the School of Mathematics, Statistics and Applied Mathematics, NUI Galway.  
I worked to set up a digital repository of traditional and online undergraduate mathematics problems for the first year mathematics courses in NUI Galway under my supervisor Dr. Graham Ellis. The internship involved converting questions to a digital/online format and designing new variants of questions in a format suitable for use online.

## Skills Profile

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**Problem Solving:** I have undertaken many problem solving projects and learned to take a systematic approach to research during my internships and my current research. I believe my academic results are evidence of my problem solving and mathematical ability.

**Leadership:** I have captained many of the sports teams I have been involved in and developed good leadership skills. I won best CEO in the All-Ireland BlastBeat competition in 2007 for my role in leading our mini multimedia and music company to third place in the overall competition. I have also received the ALIVE certificate from NUIG for volunteering as a student mentor and as a member of the ultimate frisbee committee.

**Teamwork:** I developed the ability to work efficiently as a member of a group or team by being involved in many team sports and also undertaking group projects in university. In particular I developed the high level of teamwork skills necessary to win All-Ireland medals while rowing for Coláiste Iognáid Rowing Club, to represent Ireland at the European Championships of Beach Ultimate in Calafell, Spain in 2013 and the World Championships of Beach Ultimate in Dubai in 2015 and to win two NUIG sports awards, for my role as kayak polo team captain in 2015 and Irish ultimate frisbee international player in 2016.

**Computing:** I obtained the European Computer Driving Licence Qualification in 2007. I have also worked extensively with LaTeX, Matlab and GEPHI and Excel during the course of my research. Finally, I have recently completed a university module in object oriented programming.

**Communication & Instruction:** I have developed good communication and instruction skills; both written and oral through my roles as a grinds teacher, a tutor, a kayaking instructor, an ultimate frisbee coach and public relations officer for NUIG Ultimate.