Research and Innovation Overview 2024
Department of Mathematics and Statistics

The Department of Mathematics and Statistics at Maynooth University continues to thrive, with 21 permanent academic staff amounting to 19 full-time equivalents (FTEs), including secondments to the Hamilton Institute and the Maths Support Centre. The department oversees six postdoctoral researchers, including the winner of the Eamon de Valera Postdoctoral Fellowship in the Mathematical Sciences. In the 2022-23 academic year, 48 postgraduate students graduated from the department, including 6 PhD and 6 research MSc students.

Head of Department: Professor Stephen Buckley

Research Themes and Focus Areas

The department's research spans a wide range of topics in mathematics and statistics, with key focus areas including:

- Data Science and Digital Transformation: Faculty members are advancing research in machine learning, artificial intelligence, and data-driven methods for complex systems.
- Sustainability and Climate Change: Researchers are contributing to the development of statistical models for assessing environmental impacts and climate resilience.
- Health and Wellbeing: The department's research in this area addresses key issues in public health, particularly using statistical approaches for analysing health data.

Significant Research Outputs

In 2022-23, the Department of Mathematics and Statistics produced several high-impact research outputs and secured significant research funding:

Publications
- Dr Rafael de Andrade Moral co-authored a paper published in Nature Communications, which explores new genetic barcoding technology to study the effects of ageing on blood cell production.
- Dr Niamh Cahill published a paper in Environmetrics that provides a statistical model to reconstruct hydroclimate variables, contributing to climate resilience research in South East Queensland, Australia.
- Dr Ann O'Shea co-authored a paper in Educational Review, which used machine learning approaches to identify interventions for improving teacher job satisfaction.

Awards and Grants
- The department secured €490,000 in research funding, including €146,000 awarded to Dr Niamh Cahill as part of the GoGreenNext project, funded by Horizon Europe, focusing on climate change and grassland resilience.
- Dr Rafael de Andrade Moral and Professor Andrew Parnell were awarded grants from the Department of Agriculture, Food and the Marine for projects related to predicting bovine viral diarrhoea and mycotoxin contamination.

Collaborations and Partnerships

The department fosters strong collaborations with both national and international institutions:

- Centre for Ocean Energy Research: The department continues its close collaboration with this centre, with several postdoctoral researchers contributing to research in marine sustainability and energy solutions.
- International Collaborations: Faculty members maintain active partnerships with universities and research institutes worldwide. Notable collaborations include work with the Norwegian Institute of Bioeconomy Research on the effects of climate change on grasslands, and partnerships with institutions in Brazil and India through visiting research programmes.

Research Impact and Societal Contributions

The department's research has significant societal impact, particularly in addressing climate change, public health, and education:

- Climate Change: Dr Cahill's work on sea-level rise projections is informing global coastal adaptation planning, and her statistical models are being used to assess climate resilience in ecosystems.
- Public Health: The department's research on health data is contributing to public health strategies, particularly in modelling the spread of diseases and the effects of public health interventions.

Future Directions

Looking ahead, the department will continue its focus on data science, climate change resilience, and public health. Future research projects will expand collaborations with international partners and further integrate machine learning techniques into the study of complex systems.

The Department of Mathematics and Statistics at Maynooth University remains a leader in interdisciplinary research, producing high-quality outputs and securing competitive research funding. The department's work continues to shape the future of mathematics and statistics, with strong contributions to societal challenges.