

Fintan Hegarty

Production Manager — Mathematical Sciences Publishers, University of California, Berkeley

2021–present

- Compilation and publication of journal issues.
- Administration of article supplementary material on our server.
- Recruitment and training of new production staff.
- Assignment of workload to editors.
- Final check of editors' work.

Production Editor — Mathematical Sciences Publishers, University of California, Berkeley

2016–present

Journals I have worked on: *Rocky Mountain Journal of Mathematics*, *Journal of Integral Equations and Applications*, *Pacific Journal of Mathematics*, *Journal of Software for Algebra and Geometry*, *Involve*, *Algebraic and Geometric Topology*, *Geometry and Topology*, *Algebra and Number Theory*, *Innovations in Incidence Geometry*, *Probability and Mathematical Physics* and *The Open Book Series*.

- Edit and proofread peer-reviewed mathematical and computer science articles prior to publication.
- Format manuscript typesetting (in \LaTeX) to conform to journals' styles.
- Write computer scripts (in Perl, Python, bash, Vim) to automate and improve certain editing tasks.
- Liaise with managing editors, authors, graphic designers, printers.
- Write documentation for code tutorials and standardised style guides.
- Monitor metadata and bibliographic content.

Freelance Contractor

2017–2019

Various online contracts: editing books, theses, research papers, and resumés. Writing reviews. Some mathematical consulting, including writing computer programs (in Javascript, Python).

Lecturer — University of Limerick

2016–2017

Lectured on the University of Limerick's "Professional Diploma in Mathematics for Teachers", a postgraduate course which qualified second-level teachers with non-mathematical backgrounds to teach mathematics to pre-university level.

- Taught a class of around thirty teachers, explaining material, working through questions, etc.
- Monitored relevant online discussion forum and responded to queries.
- Administered and marked assignments and exam scripts.

Postdoctoral Research Fellow — University of Birmingham

2013–2015

Worked on a branch of signal processing as a member of the Theoretical and Computational Optimization Research Group. My specific area of research was in compressed sensing.

- Wrote algorithms (in Matlab) for manipulation and analysis of a certain type of sensing matrix.
- Coauthored a research paper displaying benefits of my approach: increased speed and accuracy in some scenarios.
- Attended regular meetings to discuss group members' research and present my own findings.
- Attended relevant conferences around the country and presented my research abroad.
- Reviewed other group members' manuscripts prior to journal submission.

Tutor of Mathematics — National University of Ireland, Galway

2008–2011

Worked as a tutor in the School of Mathematics, Statistics and Applied Mathematics, while doing my PhD. Courses taught were: *Mathematics and Statistics for Business* for Commerce, *Mathematics* for Science, and *Quantitative Techniques for Business* for Business Information Studies undergraduates.

- Taught a wide range of topics to classes of up to sixty students.
- Was responsible for online course component (Blackboard, MyMathLab) for four hundred students.
- Provided supplementary support for struggling and non-traditional students.
- Invigilated and marked exams.

Private Tutor

2007–2018

I have, at various intervals, provided extra-curricular mathematics instruction to a range of individuals and small groups; Leaving Certificate students and Commerce, Computer Science, Engineering, and Science undergraduates.

Public Engagement

- During my doctoral studies, I founded a monthly newsletter for which I wrote mathematical puzzles and collated and edited fun science articles from my peers. These were distributed around campus, with the aims of subtly educating the reader, and more importantly, distracting the writers from their theses.
- I organised a series of open-air “guerilla” lectures aimed at the general public, where, armed with a whiteboard and a marker, researchers would attempt to educate random passers-by on topics ranging from juggling to astrophysics.
- Served on the University Societies Coordination Group, which oversees all university society activity; budgeting, dispute resolution, liaising with university staff and the public, annual awards, etc.
- Partook in “Bright Club”—an event for presenting research through the medium of stand-up comedy.

Current Research

Running a summer research group with participants ranging from second-level to postgraduate students. The goal is to have participants create a chess AI using machine learning to play Rook and King endgames, and host this online.

Coauthoring a data analytics/maths education case study to investigate attributes of student engagement with online learning materials during the pandemic, and working to expand the project to a more general setting post-pandemic, incorporating online systems to assist second-level students with the transition to third-level learning.

Funded by a *Strategic Alignment of Teaching and Learning Enhancement* bursary.

Working on machine learning software to provide automated suggestions for suitable referees for peer review.

Education

Higher Diploma in Computing/Data Analytics, Galway-Mayo Institute of Technology

2019–2020

Included Python, C, Java, MySQL, APIs, web development, machine learning.

Ph.D. in Mathematics, National University of Ireland, Galway

2008–2013

Completed my thesis, *Computational Homology of Cubical and Permutahedral Complexes*, under Prof. Graham Ellis.

- Developed theory for novel computational homology methods in topological data analysis, using tessellations based on analogues of an n -dimensional hexagon, as opposed to the traditional square. This led to speed-up in many cases, and allowed for the analysis of higher-dimensional data.
- Created an open-source software package (using the C based GAP system for discrete computational algebra) for the analysis of data based on this hexagonal-analogue tessellation, implemented for image data in up to four dimensions.
- Coauthored a research paper on the main aspects of my thesis.

B.Sc. (Hons) in Financial Mathematics and Economics, National University of Ireland, Galway

2004–2008

Final Year Project: *Understanding the Riemann Hypothesis*: A layman’s explanation of (but unfortunately no solution to) possibly the most important unresolved problem in pure mathematics.

Diploma in Irish, National University of Ireland, Galway

2004–2006

European Computer Driving Licence Certificate, Magh Ene College, Donegal

2003–2004

Leaving Certificate, Magh Ene College, Donegal (highest mark in the college that year)

2001–2003

Publications

A survey on Hadamard’s maximal determinant problem, P. Browne, R. Egan, F. Hegarty, P. Ó Catháin, *preprint*, 2021

Sparsification of matrices and compressed sensing, F. Hegarty, P. Ó Catháin, Y. Zhao, *Irish Math. Soc. Bull.*, 2018.

Computational homotopy of finite regular CW-spaces, G. Ellis and F. Hegarty, *J. Homotopy and Related Structures*, 2013

Computational homology of cubical and permutahedral complexes, Ph.D. thesis, 2012, supervised by Prof. Graham Ellis.