Dr Matina Trachana

Professional Experience

11/2021 – present **Teaching Fellow in Mathematics, School of Mathematics, Cardiff University, UK.**
- Teaching undergraduate and postgraduate modules in mathematics and statistics, with 130 frontal teaching hours per academic year.
- Supervising MSc dissertations.
- Engaging in research on moment problems.

Education

2017 – 2022 **PhD in Mathematics, School of Mathematics, Statistics and Physics, Newcastle University, UK.** Thesis title: *A Flat Extension Theorem for Truncated Matrix-Valued Multisequences.* Supervisors: Dr. D. Kimsey, Dr. E. Kakariadis, Dr. M. Dritschel.

2014 – 2015 **MSc in Mathematics, Direction: Pure Mathematics [8.95/10 Excellent], Department of Mathematics, University of the Aegean, Greece.** Dissertation title: *An Introduction to Operator Theory* (in Greek). Advisor: Dr. E. Felouzis.

2010 – 2014 **Ptychion (BSc) in Mathematics, Department of Mathematics, University of the Aegean, Greece.**

Publications

2022 D. P. Kimsey and M. Trachana, *On a Solution of the Multidimensional Truncated Matrix-Valued Moment Problem*, Milan J. Math. **90**, 17–101 (2022).

2022 M. Trachana, D. P. Kimsey, *A Solution of the Truncated Multidimensional Matrix-Valued Moment Problem*, presented at the 2022 Virtual JMM, US. Abstract published in *Abstracts of Papers Presented to the American Mathematical Society.*

Grants

2024 Taith Research Mobility Grant, funded by the Welsh government. Awarded £1,580 to support a research collaboration visit to the Department of Mathematics and Computer Science, University of Cagliari, Italy. The visit was hosted by Dr. M. Infusino and focused on the N-representability problem and its connections to moment problems.

2021 LMS Travel Grant for Early Career Researchers. Awarded £500 towards my participation in the Joint Mathematics Meetings 2022, US.

2018 LMS Postgraduate Research Conference Grant. Awarded £4,000 as part of the organising committee for the Young Functional Analysts' Workshop at Newcastle University.

2017-2021 PhD studentship, granted by the School of Mathematics, Statistics and Physics, Newcastle University, for 3.5 years (full time).

Research Interests

My research interests include multidimensional matrix-valued moment problems, applications of moment problems, and function theory. In particular:

1. On possible connections between the moment problem and the N-representability problem with implications to quantum chemistry.

2. On novel techniques in the theory of Hilbert function spaces.

Invited Talks

At conferences and workshops

06/09/2022   Truncated Moment Problems Special Session, International Workshop on Operator Theory and its Applications 6-10 September 2022, Krakow, Poland. Talk title: *On a Solution of the Multidimensional Truncated Matrix-Valued Moment Problem*.

09/04/2022   ILAS Special Session on the Interplay of Matrix Analysis and Operator Theory, Virtual JMM 6-9 April 2022, US. Talk title: *A Solution of the Truncated Multidimensional Matrix-Valued Moment Problem*.

12/08/2021   Young Functional Analysts' Workshop, Lancaster University, UK, 12-14 August 2021. Talk title: *A Flat Extension Theorem for Truncated Matrix-Valued Multisequences*.

At seminars

01/07/2024   Mathematics Seminar, Department of Mathematics and Computer Science, University of Cagliari, Italy. Talk title: *On a solution to the truncated matrix-valued moment problem on $\mathbb{R}^d$*.

28/4/2022   GAPT Seminar, Cardiff School of Mathematics, UK. Talk title: *On a Solution of the Multidimensional Truncated Matrix-Valued Moment Problem*.

14/12/2020   Analysis Seminar, School of Mathematics, Statistics and Physics, Newcastle University, UK. Talk title: *The Matrix-Valued Moment Problem for Flat Data*.

09/03/2020   Postgraduate Forum, Lancaster University, UK. Talk title: *The Truncated Matrix-Valued Moment Problem on $\mathbb{R}^d$*.

Participation in Conferences (selection)

21-26/05/2023   Joint Spectra and Related Topics in Complex Dynamics and Representation Theory, Banff International Research Station for Mathematical Innovation and Discovery (BIRS), Banff, Canada .

22-26/07/2021   Working Groups for Women in Operator Theory, Lorentz Centre (online).

20/11/2020   North British Functional Analysis Seminar, Newcastle University (online).

08-13/07/2019   8th Summer School in Operator Theory at the University of Athens, Greece.

03-05/04/2019   Young Functional Analysts' Workshop at the University of Leeds, UK.

01-02/11/2018   North British Functional Analysis Seminar at Oxford University, UK.

09-14/07/2018   7th Summer School in Operator Theory at the University of Athens, Greece.

12-14/04/2018   50th Anniversary Meeting of the North British Functional Analysis Seminar at ICMS, Edinburgh, UK.

02-03/11/2017   Spectral Theory of Hankel Operators and Related Topics at King's College London, UK.

Research Management Experience

-Workshop Organisation: Co-coordinated the Young Functional Analysts' Workshop 2018 at Newcastle University, in collaboration with Dr Z. Lykova, Dr D. Chiotis, Dr O. Alsalhi, Dr H. Alshammari, Dr R. Bickerton, and Dr A. Ajibo. The event was funded by the London Mathematical Society and the School of Mathematics, Statistics and Physics.

-Peer-reviewer for the Complex Analysis and Operator Theory journal.

MSc Dissertations Supervision

○ Tianyue Zhao, MSc Data Science and Analytics, *Data Analysis of Wildfire Behaviour: Machine Learning Forecasting Models*, June-September 2024.

○ Dida Zhang, MSc Data Science and Analytics, *Data Analysis of Wildfire Behaviour*, June-September 2024.

○ Kushagra Raina, MSc Artificial Intelligence, *Time Series Forecasting for National Market Index*, September-December 2023.

○ Akash Kamble, MSc Data Science and Analytics, *Analysis and Classification of Online News Popularity*, September-December 2023.

- Oscar Taylor, MSc Operational Research and Applied Statistics, *Data Analysis of Wildfire Behaviour-Understanding Fire Dynamics*, June-September 2023.
- Glyn Wells, MSc Mathematics, *The Spectral Theorem for Hermitian Matrices*, June-September 2023.
- Provided assistance to the MSc cohort through a drop-in dissertation support service during the summers of 2022/23 and 2023/24.

Teaching and Assessment Experience

At Cardiff University

Autumn 2024/25	Algebra II: Rings (22 hours, 60 students): design and delivery of lectures, problem sheets, quizzes and exams as module leader.
Spring 2023/24	Ordinary Differential Equations (22 hours, 30 students): designed and delivered lectures, problem sheets, quizzes and exams as module leader.
Autumn 2023/24	Linear Algebra II (15 hours, 120 students): designed and delivered lectures. Geometry (5 hours, 20 students): designed and delivered tutorials.
Autumn 2022/23	Algebra II: Rings (11 hours, 20 students): designed and delivered lectures as co-module leader.
Spring 2021/22	Real Analysis (5 hours, 20 students): designed and delivered problem classes.
2021/22– 2023/24	Foundations of Statistics and Data Science (48 hours, Autumn, 150 students), Credit Risk Scoring (4 hours, Autumn, 40 students), Econometrics for Financial Mathematics (5 hours, Autumn, 50 students): led computer-based classes in R. Foundations of Mathematics II (88 hours, Spring, 120 students): provided workshop support.
	Conducted exam assessments, coursework marking, and problem sheet evaluations for undergraduate and postgraduate modules.

At Newcastle University

Autumn 2020/21	Introductory Algebra (15 hours, 120 students): designed and delivered synchronous online activities. Assessed several mathematics assignments (2017-2021).

Teaching Merits

2022	Nomination for Most Engaging Staff Member in the Enriching Student Life Awards 2022.

Teaching Qualifications and Training

07-08/09/2023	CETL-MSOR 2023. School of Mathematics, Cardiff University. Conference for all involved in the teaching and learning of Mathematics, Statistics and Operational Research in Higher Education.
29/06/2023	Award of Associate Fellowship of the Higher Education Academy (AFHEA), *(Ref. PR266813)*, and in parallel, recognition as a Cardiff University Education Associate Fellow.
14-15/09/2022	Induction Course for New Lecturers in the Mathematical Sciences, IMA Cambridge.
24/01/2019	Introduction to Learning and Teaching in Higher Education, Newcastle University. One-day workshop on demonstrator training.
28/02/2018	Introduction to Learning and Teaching in Higher Education, Newcastle University. One-day workshop on seminar delivery.

Scientific Outreach

Science Communication Activities:

14/02/2024	*After Dark: Science on Show*, National Museum Cardiff.
08/03/2023	*Grangetown Career and Role Models Week*.
22/02/2023	*After Dark: Science on Show*, National Museum Cardiff.
18/02/2023	*Maths Adventures Day*, Cardiff School of Mathematics.

04/2020-07/2021	Engaged with young audiences through the online interactive event Women in Science Doing Outstanding Maths and Physics (WISDOM) hosted by the School of Mathematics, Statistics and Physics at Newcastle University. Talk titled: *The Reality of Imaginary Numbers* (pre-recorded).

Skills and Competencies

Software: proficient in LaTeX, experienced with Maple and Microsoft Office, basic knowledge of R and Jupyter notebooks.

Digital education: Blackboard, Canvas, Turnitin, Mentimeter, Geogebra, Kahoot!

Languages: English (proficient), French (intermediate), Greek (native).

Professional Memberships

European Women in Mathematics, Member, 2021 – present.

Skills and Competencies

Software: proficient in LaTeX, experienced with Maple and Microsoft Office, basic knowledge of R and Jupyter notebooks.