

# Nicholas Sale

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**Citizenship:** British

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Swansea University, Wales. SA1 8EN

**Research interests** Topological Data Analysis, Applications of Persistent Homology, Applied Topology, Phase Transitions, Statistical Physics, Machine Learning

**Education**

<b>Swansea University</b>	Swansea, UK
PhD in Mathematics	Oct 2019 – Present
Supervisors: Prof. Jeff Giansiracusa, Prof. Biagio Lucini	
Current Title: Applications of Topological Data Analysis to Statistical Physics	
Expected Completion: Autumn 2022	

<b>University of Oxford</b>	Oxford, UK
MMathCompsci Mathematics & Computer Science	Oct 2015 – Jul 2019
First Class	

<b>Honors and scholarships</b>	Swansea University Research Excellence Scholarship	2019-2022
	Undergraduate Scholarship (New College, Oxford)	2016-2019
	CyberFirst Bursary (UK Civil Service)	2015-2019
	Arkwright Engineering Scholarship (Arkwright Foundation)	2013-2015

<b>Prizes and awards</b>	SIAM Student Travel Award (to attend SIAM AG21)	Aug 2021
	Winner of TopFlavours Gongshow	Jun 2021
	2 <sup>nd</sup> place in Welsh Mathematics 3-Minute Thesis Competition	Mar 2021

<b>Invited Talks</b>	<b>Quantitative analysis of phase transitions in two-dimensional XY models using persistent homology</b>	Sep 2021
	Machine Learning for High Energy Physics, on and off the Lattice ECT* Trento (hybrid)	
	<b>Persistent Homology for Phase Transitions</b>	Nov 2020
	UK Centre for TDA, University of Oxford (online), November 27, 2020	

<b>Contributed Talks</b>	<b>Persistent Homology and Phase Transitions</b>	Jun 2021
	TopFlavours, University of Warwick (online), June 18, 2021	

<b>Teaching experience</b>	<b>Teaching assistant, Department of Mathematics (Swansea University)</b>	
	MA-308: Machine Learning	Lent Term 2021
	MA-131: Geometry, Logic, and Communication	Michaelmas Term 2020
	MA-262: Numerical Methods	Lent Term 2020

## Other Service

**Organiser of Swansea Maths PhD Seminar** Jun 2021 - Present  
**Co-organised minisymposium for SIAM AG21** Aug 2021  
 Invited speakers for a 2-session minisymposium on Persistent Homology for Phase Transitions, co-organised with Quoc Hoan Tran.  
**Assisted with the LMS Undergraduate Summer School** Jul 2021  
 Spoke to participants about my experience of doing a PhD during coffee breaks throughout the 2 week event hosted by Swansea University.

## Research experience

**Applied Research Summer Placement**  
 UK Civil Service Jul 2018 – Sep 2018  
 An 11-week placement researching how machine learning and other data science techniques could be applied to aid my team with data annotation. Presented my work and an introduction to topological data analysis in a seminar for the data science community within the government department.

**Applied Research Summer Placement**  
 UK Civil Service Jul 2017 – Sep 2017  
 An 11-week placement researching the feasibility of using data science techniques to identify certain types of network devices based on limited information about their traffic. Presented my work at the kick-off meeting for an external workshop on analysing network traffic and as a seminar for the data science community in the government department.

## Technical skills

**Programming**  
 Python (numpy, sci-kit learn, pandas), Java, C<sup>#</sup>, Javascript  
**Cluster Computing**  
 Slurm, Spark

## Non-academic positions

**New College Boat Club Committee** New College, Oxford  
 President 2018-2019  
 Secretary 2017-2018  
 Lower Boats Captain 2016-2017  
 Women's 3<sup>rd</sup> Boat Coach 2018-2019  
**Bar Sports Captaincies** New College, Oxford  
 Darts Captain 2017-2018  
 Pool Captain 2016-2017  
**Oxford University Roleplaying Game Society** Oxford  
 Netrep (IT Secretary) 2016-2018