Nathanael Chwojko-Srawley

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EDUCATION

Undergraduate Degree at the University of Toronto	SEPT 2017
Specialist in Mathematics, Minor in Computer Science (Deans List Scholar)	- MAY 2023
GPA in 3rd and 4th year: 3.96/4	

RESEARCH EXPERIENCE

Classifying Automorphism-Representable Groups	MAY 2021
Supervisor: Ehsaan Hossain	- AUG 2021
Research Opportunity Program (ROP)	
Generalizing the classical result from group theory that there does not exist a group G such that $\mathrm{Aut}(G) = \mathbb{Q}$, I worked on finding conditions on a group G for which $\mathrm{Aut}(G) = H$ exists for various of groups H (ex. $H = \mathbb{R}, \mathbb{Z}, \prod_i \mathbb{Z}$)	

Almost Global Existence for Nonlinear Wave Equations	MAY 2022
Supervisor: Yakov Shlapentokh-Rothman	- AUG 2022
Received Grant of $7500 From the MCSRA	
Building off of the work of Sergiu Klainerman, I worked on finding almost global existence for nonlinear wave equations in the setting of time dependent inhomogeneous media and Schwarzschild black hole exterior	

SENIOR THESIS

Connections in Algebra and Geometry	SEPT 2021
Supervisor: Ehsaan Hossain	- DEC 2021
Using The Stacks Project and Vakil, as well as some independent research, I found solutions to a list of open-ended problems presented by my supervisor in the fields of commutative algebra and algebraic geometry. I presented interesting results at undergraduate seminars.	

TALKS I HAVE GIVEN

Automorphism-Representable Groups	AUG 2021
Smarti Gras Convention	
I presented my ROP research results, in particular some properties of groups G where $\mathrm{Aut}(G) = \mathbb{Z} \times \mathbb{Z}$	

Functional Analysis and Sobelev Spaces	JULY 2022
Canadian Undergraduate Mathematics Conference (CUMC)	
I presented on topics within Functional Analysis concerning Sobelev spaces, as well as their application to my research in PDEs	

Introduction to Modern Algebraic Geometry

Mathematics Student Talk

Oct 2022

I presented on the foundations of modern Algebraic Geometry, its connection to Differential Geometry, and on the classification of algebraic surfaces.

Consequences of Nakayama's Lemma

Senior Thesis

Nov 2021

I presented Nakayama's lemma as well as some consequences (ex. a finitely generated module M over a commutative ring A implies that surjective endomorphisms are injective, or that an absolutely flat local ring is a field)

Artin-Tate Lemma

Senior Thesis

Nov 2021

I presented on the Artin-Tate lemma, which is the commutative algebra equivalent of a subgroup of finite index of a finitely generated subgroup is finitely generated

Applications of Category Theory

Mathematics Student Talk

Nov 2021

I presented on the intuitions behind Category theory and 'Categorical thinking', common examples of categorical constructions, and the applications of Category theory to the fields of Algebra, Analysis, Physics, and Computer Science

Integral Extensions and Localizations

Senior Thesis

Sept 2021

I presented proofs of the Lying-Over, Going-Up, and Going-Down theorem, how they translate in the context of the localization of rings, and made connections to algebraic geometry

Classification of Divisible Groups

Seminar

Jul 2021

I presented on the classification of divisible groups, and elementary theory of injective modules.

Talks I have Attended

Akshay Venkatesh Fields Symposium

Fields Medal Symposium

Oct 2022

Presentation by Emily Riehl on revisiting the foundations of Mathematics via type theory and univalent foundations

Curvature in Metric Geometry

Seminar

Sept 2022

Presentation by Nicola Gigli introducing how the idea of Gaussian curvature from Riemann Geometry can be imported into Metric Geometry

A First Encounter with Diffeology

Seminar

Oct 2022

Presentation by David Miyamoto introducing the notion of Diffeology, including many examples (Ex. manifolds, orbifolds, quasifolds) and some basic constructions

P=W Conjecture Solved

Seminar

Oct 2022
- Nov 2022

I attended a series of presentations on 2 recent papers by Mauilik and Shen proving the $P = W$ conjecture

Teaching Experience

Teaching Assistant (TA)

<div align="right">SEPT 2021 - APR 2023</div>

Prepared and ran tutorials, graded assignments, held office hours, and invigilated tests. Courses I was a TA for are:

- Abstract Algebra (MAT301)
  Jan 2023-Apr 2023

- Abstract Algebra (MAT301)
  Sept 2021-Dec 2021

- Linear Algebra II (MAT224)
  July 2021-Aug 2021

- Linear Algebra II (MAT224)
  May 2021-June 2021

- Combinatorics (MAT202)
  Jan 2021-Apr 2021

- Calculus II (MAT136)
  Sept 2020-Dec 2020

Independent Study Units

Quivers and their Representations

<div align="right">JAN 2022 - APR 2022</div>

One-on-one course covering Quiver Decomposition, Root Systems, Gabriel's Theorem, Path Algebras of Quivers, and relation to Lie Algebras

Module Theory

<div align="right">SEPT 2020 - DEC 2020</div>

One-on-one course covering the construction of Modules, tensor algebras, projective/injective/flat modules, and homological algebra from a computational approach

Volunteer Experience

UTM Math Club Administrator

<div align="right">NOV 2020-</div>

I am actively involved in the mathematical community in answering questions, sharing new perspectives, facilitating events, and guiding newer students

(member count: ≈ 3785)

Everything You Need To Know About Algebra

<div align="right">AUG 2019-</div>

Wrote pedagogical book on Algebra comprehensively covering areas in undergraduate mathematics from group, ring, module, and field theory, to commutative algebra and representation theory. Available at http://www.nathanaelsrawley.com/Notes

Work Experience

Software Developer

<div align="right">MAY 2019 - AUG 2020</div>

Full stack software developer at SOTI working in the next generation team which focused on future projects for the company