

# Calum Hughes

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## CONTACT

### INFORMATION

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## RESEARCH

### INTERESTS

Category Theory,  $\infty$ -Category Theory, Homotopy theory, Homotopy type Theory (HoTT), Algebraic Topology and also topics in Analysis. I am particularly interested in the interface between Category Theory and other areas of study.

## EDUCATION

**University of Sheffield**, on track for a First degree

- MMath in Mathematics, to be completed June 2022
  - Master’s Thesis: “*The Dold-Kan Correspondence*” supervised by Prof. Sarah Whitehouse.
  - Relevant modules I have taken are Algebraic Topology, Commutative Algebra and Algebraic Geometry, Metric Spaces, Knots and Surfaces, Combinatorics, Fields, Differential Geometry, Galois Theory, Functional Analysis.

## RESEARCH

### INTERNSHIPS

1. Undergraduate Research Internship project: “*Simplicial Sets*”, supervised by PhD student James Brotherston. This was a competitive position funded by the School of Mathematics and Statistics.
2. “*Dynamics of Linear Operators: Limit Sets in Finite Dimensions*” project, supervised by Dr. Dimitrios Roxanas, funded by the London Mathematical Society. This was a competitive UK-wide place to study a 2-month project over the summer of 2021 (work still in progress; potential for a publication).

## ACADEMIC

### PRESENTATIONS

1. “Category Theory and Simplicial Sets”, Undergraduate Summer Research presentations 2019-2020, University of Sheffield, September 2020.
2. “An Introduction to Simplicial Sets”, [Tomorrow’s Mathematicians Today conference](#), The University of Greenwich, March 2021.
  - This was a UK-wide conference funded by the Institute of Mathematics and its Applications, to over 100 people.
  - I was specifically mentioned with positive feedback from the official delegates poll. Comments included: “clearly explained and good images to aid descriptions of confusing topics”, “I particularly enjoyed the talk of Calum Hughes” and “Calum Hughes’ “*An Introduction to Simplicial Sets*” really made me want to read more on the topic Category Theory, clear and entertaining.”
3. “Dynamical Systems and Chaos”, Undergraduate Summer Research 2020-2021, University of Sheffield, September 2021.

## PARTICIPATION IN

### CONFERENCES AND SEMINARS

1. String Topology, Algebraic Topology seminar, University of Sheffield, 2020
2. MiaowMiaow, Category Theory seminar, University of Sheffield, 2021.

3. Tomorrow's Mathematicians Today conference, The University of Greenwich, March 2021.
4. Categories and Companions Symposium, June 8 -12, 2021.
5. London Mathematical Society Summer School 2021, University of Swansea, 12 - 23 July 2021.
6. University of Sheffield Category Theory reading group, October - December 2021.

#### PRIZES AND AWARDS

- **T. M. Flett Prize in Pure Mathematics** for the best performance in Pure Mathematics modules 2020, and again in 2021.
- **Best Team Submission** in the School of Mathematics and Statistics annual team Mathematics challenge, 2018.
- Awarded Undergraduate Research Internship bursary from the University of Sheffield School of Mathematics and Statistics, 2020.
- Awarded Undergraduate Research Bursary from the London Mathematical Society 2021.

#### OTHER RELATED ACTIVITIES

- I am a student representative on the School of Mathematics and Statistics Teaching Committee.
- I am a Level 4 academic representative for the Staff Student Forum.
- I have regularly attended Advanced Problem Solving sessions at the University of Sheffield. These involve working on difficult Algebra or Analysis problems unlike that which we would see in our modules and presenting our solutions to each other as part of a group.
- I participated in the [Simon Marais](#) international mathematics competition.
- I am a member of the Institute of Mathematics and its Applications (IMA).
- I have tutored students in GCSE Maths, A-level Maths and A-level English Literature.

#### TECHNICAL SKILLS

Programming: I am comfortable with Python,  $\text{\LaTeX}$  and SageMath, but I also have familiarity with R, Haskell, MATLAB.

#### PREVIOUS EMPLOYMENT

- Glyndebourne Opera House,**
- Assistant Pit manager, 2018-2021.
  - Music Library Assistant, 2021.

#### OTHER ROLES

- President of the University of Sheffield Allotment Society 2019-2020.
- Treasurer of the University of Sheffield Allotment Society 2020-2021.
- Finance and Development Officer of the University of Sheffield Allotment Society 2021-2022.