# NATASHA DIEDEREN

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## EDUCATION

**University of Warwick, UK** — *October 2020 - Present*
2nd Year, Mathematics BSc — Provisional First: 86.1%
Department of Mathematics

**Sevenoaks School, UK** — *2018-2020*
International Baccalaureate Diploma Programme — Overall score: 44
Higher level subjects: Mathematics, Physics, Chemistry — Scores: 7 7 7
Extended Essay in Mathematics — Grade: A

## EXPERIENCE

**Undergraduate Research Support Scheme** — Coventry, UK
*University of Warwick* — *January 2022-Present*

- 10 week research project over the summer of 2022 focusing on Geometric Measure Theory and minimal surfaces under the mentorship of Felix Schulze.
- Started doing additional reading on GMT from January 2022 onwards (not part of university course).
- Aim is to write up a comprehensive proof of Berstein's Problem for minimal surfaces, but still open ended.

**Second Year Essay** — Coventry, UK
*University of Warwick* — *January 2022-Present*

- 15 page essay submitted as coursework for degree.
- Topic: Curvature estimation on triangle meshes using a generalisation of the second fundamental form.
- Recieved mark of 90% for both essay and oral presentation.

**Directed Reading Group** — Remote
*As part of the Twoples mentorship programme* — *September 2021-January 2022*

- One hour weekly meetings with a PhD student at Columbia University, going through the text *Differetial Geometry: Connections, Curvature and Characteristic Classes* by Loring Tu.
- Wrote a short essay detailing key concepts in smooth differential geometry and their analogues in discrete differential geometry.

**Summer Geometry Institute** — Remote
*Massachusetts Institute of Technology* — *July 2021-August 2021*

- One of 34 fellows chosen from a total of 627 applicants for a six week paid research programme in the field of geometry processing, organised by Justin Solomon, associate professor of Electrical Engineering and Computer Science (EECS) at MIT.
- Developed a fluid simulation algorithm that ran over triangle meshes with Paul Kry, professor at McGill University. Here is a link to the write-up.
- Built a user interface in MATLAB that used the properties of active bending to create elastic strips that would deform to the shape of a given spline based on the work of Christian Hafner and Bernd Bickel at IST Austria. Here is a link to the write-up.
- Generated and rendered Eulerian minimal surfaces in Houdini, under the guidance of Stephanie Wang, postdoc at the University of California San Diego.

- Developed an algorithm to generate triply-periodic non-manifold minimal surfaces with Nicholas Sharp, postdoc at the University of Toronto, Etienne Vouga, assistant professor at the University of Texas at Austin, and Josh Vekhter, PhD student at the University of Texas at Austin. Here is a link to the write-up.

**Extended Essay in Mathematics** Sevenoaks, UK
*Sevenoaks School* *October 2019-November 2019*

- A 4000 word, self-directed research essay submitted as part of International Baccalaureate Diploma, receiving the highest grade of an A.
- Research question: Under what conditions is the triangle formed by the Euler line of a triangle maximised? Under what conditions is in minimised?
- Involved analysis of the function of the area of the small triangle formed by the Euler line of a larger triangle as this triangle changed shape to observe local and global maxima/minima.

**Research Essay in Mathematics** Sevenoaks, UK
*Sevenoaks School* *April 2019-September 2019*

- Written as a precursor to the final extended essay (see above) submitted to the International Baccalaureate Organisation.
- Research question: How can the Euler line of a triangle be generalised to quadrilaterals?
- Involved extending the Euler line to quadrilaterals using both an analytic and a geometric method, proving that these two methods yielded the same line.

## HONOURS AND AWARDS

**The George France Mathematics Faculty Prize** *June 2020*
**The Science Merit Prize**
Both prizes awarded on graduation from Sevenoaks School.

**The Duke of Edinburgh's Award (Gold level)** *March 2020*

**The Mathematics Faculty Prize** *June 2019*
**The Science Faculty Prize**
Both prizes awarded upon completion of first year of the International Baccalaureate at Sevenoaks School.

**Academic Scholarship to Sevenoaks School** *December 2017*
Received an offer to study at Sevenoaks School as an academic scholar from August 2018 – June 2020.

## SKILLS

**Mathematics**
Differential geometry, geometric measure theory, real analysis

**Programming**
Java, Python, MATLAB, LaTeX

**Languages**
English (fluent), Mandarin Chinese (CEFR B2+), Dutch (proficient)

## VOLUNTEERING

**Summer Geometry Initiative** Remote
*Massachusetts Institute of Technology* *October 2018 - February 2020*

Was a student volunteer for the tutorial week of the Summer Geometry Institute. Helped students to complete exercises relating to geometry processing.

**Outreach Box Programme** Sevenoaks, UK
*Sevenoaks School* *October 2018 - February 2020*

Played a key leadership and organisational role in expanding the Sevenoaks School Outreach Programme. This programme provided state schools in the local area with free scientific equipment to facilitate learning, including microscopes, biological models, cameras, Arduinos, and other resources.

Catalogued all equipment and updated project website, organised the logistics of distributing boxes, and designed foam packaging to protect equipment during transportation.