Curriculum Vitae

Patrick T M Hough
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Education

DPhil Mathematics (Cryptography), University of Oxford. Estimated graduation date 05/2022.

Visiting PhD researcher in mathematics (cryptography), University of Surrey. Estimated graduation date 05/2022.

MSc Mathematics for Communication and Cryptography, Royal Holloway University Of London. Estimated graduation date: 09/17. Distinction.

MSci Mathematics, University College London. Graduation date: 1st class, 2016.

A-level Double Mathematics: A*, A*, Physics: A. AS Chemistry: A. 2012, Brighton and Hove Sixth Form College (BHASVIC).

GCSE 10A*'s (inc. Mathematics, Statistics, Triple Science, English, French, Spanish), 2A's. 2010, Chailey Secondary School.

Past Employment

University tutor, teaching weekly problem classes and marking scripts for an MSc mathematics course, 2017-.

MAT undergraduate entrance exam marker for universities requiring applicants to sit this paper. (Oxford, Imperial, Warwick).

Employed by Dennis School, Kiev, Ukraine teaching adult students and employees of the EBC (European Business Community), focusing on technical language required for human resources, summer 2015.

Mathematics and Science Tutor from pre-GCSE to A2 level and on to university entrance exams such as STEP, May 2011-September 2016, ∼8 hours p/w.

Research Experience

DPhil
During my DPhil at Oxford I will be working with Dr. Ali Kaafarani to construct attribute-based digital signatures whose security will hold up against quantum computers. This includes the study of post-quantum cryptography in general and I will also be thinking about the construction of lattice-based cryptographic protocols with quantum resistance. I am co-supervised by Prof. Liqun Chen at the university of Surrey where I am a visiting researcher helping her to to create quantum-resistant cryptography for implementation in a new generation of TPM; the chip used in nearly all communication devices to ensure the security and privacy of the user.

Publication
During my masters year at UCL (2015/16) I worked with Prof. Andrew Granville in exploring biases amongst prime numbers (analytic number theory). In the thesis that followed, I proved three new significant results. On 01/09/17 these new results were published in The Journal Of Number Theory. The paper is viewable at `http://rdcu.be/vtIY`.

Crypto Challenge (2016)
I was part of a collaboration between UCL CompSci students, selected startups and corporate sponsors (inc. Blockchain, Finyear and Clearmatics) during which we worked to expose the vulnerabilities in Bitcoin systems and other online cryptosystems. In particular my examination into how to recover a Bitcoin clients' private key will form part of the final publication resulting from this collaboration.

MSc Dissertation (2017)
During my MSc year at RHUL I worked with Dr. Martin Albrecht to scrutinise potential schemes for submission to the NIST competition which calls for cryptographic protocols whose security holds up under attack from quantum computers. This is a standardisation process after which the reviewers (including NSA and GCHQ) will publish schemes recommended for use in industry.

Undergraduate Research Project
During the summer of 2014, I worked with Professor Alexander Sobolev (dept. of

mathematics, UCL), which resulted in a paper entitled "The spectral theory of periodic differential equations". This project was guided by Prof. Sobolev with the large majority of work being conducted independently.

Awards and funding

DPhil funding inc. fees and stipend for 3.5 years, UK Govt., 2017, value: £76,562.

Highest (to date) MSci mathematics dissertation mark (95%), UCL, 2016.

Kneebone scholarship for academic excellence, RHUL, 2016, value: £1000.

UCL Studentship (Summer Research Project), 2014, grant value: £2,500.

1st year Sessional Prize, (top 5 students), 2013.

Cryptography Competition, mathematical contribution award, 2015, value: 1BTC.

Lewes Exhibition Fund (academic and sport development): 7×£400.

TASS (Lottery/Sport England) funding. £1000.

Technical Skills

Proficient ability in Python and Sage and LaTeXwith basic ability in C. Also proficient in all core computer functions including Google docs. and Microsoft Office.

Short Courses

Russian evening classes (3 terms) 2015.
Italian evening classes, (10 weeks) 2013.
Mathematica skills development workshop, (5 weeks) 2012.
Python skills development workshop, (5 weeks) 2012.

Employment Experience

Voluntary summer algebra revision classes for students beginning sixth form at BHASVIC, 2012.

Week long placement at Wakehurst Place Millennium Seed Bank, Laboratory work in a research environment, 2008.

Memberships

Institute of mathematics and its applications, Student Undergraduate membership.

Other relevant skills/achievements

Languages

- Proficient ability in French and Spanish with basic knowledge of Italian and Russian.

Sporting achievements

I train and compete in *Elite* triathlon. A few recent achievements include 3rd in the British National Super Series, 3rd National Duathlon Championships, 3rd at the Virgin Active London Triathlon, 2nd overall in the London cross-country college league.

Musical achievements

- Grade 6 flute, distinction.