School of Maths UG Summer Bursary Scheme

Coordinator: Dr Mauro Mobilia (m.mobilia@leeds.ac.uk)

Leeds undergraduate students who are based in the UK and currently in the second year of a BSc programme, or the second or third year of the MMath, BSc Integrated Masters programme, can apply to undertake a summer project with a member of staff in the School of Mathematics.

Home, EU and International Undergraduate students can also apply, as long as they are enrolled in an Undergraduate programme in the UK and are neither in their first nor in their final year of study (even if they are not at Leeds and are not studying Mathematics).

The projects are funded, at around £230 a week for around 10 weeks. Specific details will be agreed individually by each Supervisor. **This is a competitive process, and some projects include specific pre-requisite knowledge.**

Students will be allocated to projects according to the following selection criteria:

- Student's preferences (if/when possible)
- Student's grade profile (expected to be at least of a 2:1 level, and usually would need to be a 1st class)
- Student's background (or experience) in the area of the project (e.g. marks in relevant modules, pre-requisites to be met)
- Balance between the projects subscription and the availability of the academic staff
- The School's and the EPSRC's priorities (e.g. industrial links; covering a range of research areas)
- Students who are selected for a project are required to produce a report and to give an oral presentation in front of academics and other students (during approximately the 3rd week of September).

A list of projects for Summer 2018 is given below and on Minerva/VLE. To apply complete the application form and email this to Louise Feaviour (L.P.Feaviour@leeds.ac.uk**) by Friday the 23rd of February.**

Selected students will tentatively be contacted around mid-April and will be asked to meet with their prospective supervisors to discuss and agree on the details on the project, and to complete an acceptance form. Only when the acceptance form, signed by student and supervisor(s), will be returned to Louise Feaviour by 27th April 2018 will the award be effective. *Students should note that by accepting the award, they commit to submit a report and to give an oral presentation. Selected students are also asked to inform Louise Feaviour and their prospective project supervisor(s) if they receive, or have applied for, a similar award.*

The **summer 2018 projects** on offer are the following (see also on Minerva/VLE):

Project Title	Project Supervisor(s)	Pre-Requisites
Edge tracking in the Swift–Hohenberg equation	Dr Cedric Beaume *Applied Maths*	Required: MATH2391 Nonlinear Differential Equations MATH2601 Numerical Analysis with Computation A taste for numerics Suitable: MATH2620 Fluid Dynamics 1
Using homotopy to analyse quasipatterns	Dr Priya Subramanian Professor Alastair Rucklidge *Applied Maths*	The ideal candidate would have enthusiasm for solving problems numerically, would have previous exposure to Nonlinear Dynamics or Differential equations along with familiarity with any programming language.
Symmetries of Differential Equations	Professor Allan Fordy *Applied Maths*	An understanding of both groups and differential equations: MATH2022 Groups and Vector Spaces MATH2375 Linear Differential Equations and Transforms.
Preparing for the International Mathematics Competition for University Students	Professor Daniel Lesnic *Applied Maths*	First-class marks for a number of modules (see project description) and enrolment on some specific modules as specified in the project description.
Matching and Morphing	Dr Kevin Houston *Pure Maths*	Essential: Basic ability in the use of a computer package such as Maple, Matlab, or Mathematica or programming language, for example, Python. The pre-requisites are the core first year modules. Desirable: An interest in the geometry of shapes.
Caricatures from 3D selfies	Dr Kevin Houston *Pure Maths*	Essential: Basic ability in the use of a computer package such as Maple, Matlab, or Mathematica or programming language, for example, Python. The pre-requisites are the core first year modules. Desirable: An interest in the geometry of shapes.
Cutting Up Bodies: Segmentation of Shapes	Dr Kevin Houston *Pure Maths*	Essential: Basic ability in the use of a computer package such as Maple, Matlab, or Mathematica or programming language, for example, Python. The pre-requisites are the core first year modules. Desirable: An interest in the geometry of shapes.
Continued Fractions and Möbius Maps	Dr Vladimir Kisil	There are no special prerequisites beyond a good knowledge of compulsory courses in

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	Pure Maths	algebra, geometry and analysis.
SL2(R) Group for a Discrete Ring R	Dr Vladimir Kisil *Pure Maths*	There are no special prerequisites beyond a good knowledge of compulsory courses in algebra (groups, rings, fields) and geometry. Ideally, you have learnt "MATH3232 Transformation Geometry" and enjoyed it.
Locally rigid graphs and hypergraphs	Professor H. Dugald Macpherson *Pure Maths*	The only necessary background is some discrete mathematics, as in MATH2230 Discrete Mathematics.
Links, Loop Braids and Topological Quantum Computing	Professor Paul Martin Dr Joao Faria Martins *Pure Maths*	Groups and vector spaces (or equivalent).
Applications of higher dimensional category theory in geometry, topology and mathematical physics	Professor Paul Martin Dr Joao Faria Martins *Pure Maths*	Groups and vector spaces (or equivalent).
Ehrenfeucht-Fraïssé Games and coloured linear orders	Professor John Truss *Pure Maths*	The prerequisite is a strong background in pure mathematics; see description for more details.
Dropping worms on a (random) walk	Dr Stuart Barber *Statistics*	MATH2750 would be helpful, as would willingness to engage in programming.
Classification with missing data	Dr Stuart Barber *Statistics*	An interest in statistical data analysis. No specific module pre-requisites.
Random Partitions and Their Limit Shape	Dr Leonid Bogachev *Statistics*	Essential: Good marks (65 or higher) on MATH1710 or equivalent (essential). Desirable: Good marks (65 or higher)on one or more of the following: MATH2016/MATH2210/MATH2750.
Random Matrix Theory: Basics and Spectral Asymptotics	Dr Leonid Bogachev *Statistics*	Essential: Good marks (65 or higher) on MATH1710 and on one of the following: MATH1060/MATH1331. Desirable: good programming skills for simulation of random matrices.
The Archetypal Equation with Rescaling	Dr Leonid Bogachev *Statistics* Dr Vladimir Kisil *Pure Maths*	Essential: Good marks (65 or higher) on one or more of the following: MATH1710/MATH2016/MATH2375/MATH2600/MATH2750; Desirable: some computing skills for numerical analysis.