University of Cambridge Centre the Mathematics of Information (CMI) 2020 Call for Short (4-6 week) Projects for First Year PhD Students

Opening Date	30 September 2020
Closing Date	13 November 2020
Project proposers	Proposals invited from users of mathematics: University of Cambridge Departments; partners from business or industry.
Location of and timing of projects	First year PhD students carry out the research projects at the Centre for Mathematical Sciences in Cambridge. Projects are 4-6 weeks in work in total, conducted between December 2020 and March 2021.
Funding	No fee required

Introduction to the Cambridge Centre for the Mathematics of Information (CMI)

The University of Cambridge has been at the forefront of the study of mathematics and its benefits to society for many centuries. Our current mathematical community thrives at the Centre for Mathematical Sciences (CMS), where the CMI is one of the embedded Institutes. Around 50 mathematicians from across the Faculty are involved with the CMI, which is under the Directorship of Professor Carola Schönlieb and Professor Richard Nickl.

Vision

The advancement of data science and the solution of big data questions rely heavily on fundamental mathematical techniques and in particular, their intra-disciplinary engagement. This is at the heart of the CMI, which encompasses mathematical expertise spanning: statistics, applied & computational analysis, inverse problems, convex analysis, stochastic and sparse optimisation, sparsity, compressed sensing, sampling theory, probability theory, random matrices, harmonic analysis, partial differential equations, functional analysis, fluid mechanics, mathematical biology, discrete geometry, quantum information, topology and graph theory. All with the common goal of furthering the understanding of both the theory and applications of information and data science. We believe that this broad mathematical scope gives rise to scientific synergies that makes the CMI an exciting place for novel mathematics as well as creating impact in data-driven applications such as machine learning and artificial intelligence.

First Year PhD Projects

The CMI is training the next generation of mathematicians who will advance modern mathematics and provide solutions for future industrial and societal needs in all areas of big data. CMI PhD students embark on a unique structured programme that offers core research training in the first year, including the opportunity to work on a short (ca 4-6 week) external research project provided by a 'user of mathematics' (i.e. other University Departments or business/industry).

Benefits for Partner Organisations

Mathematics can often provide new approaches/perspectives to resolving problems. Hence, external projects offer the opportunity to engage the skills of talented mathematicians to tackle challenging research questions across a diverse range of fields. This is also an ideal way to become involved in the CMI, to develop relationships with the academics and students and to engage with the Faculty of Mathematics at the University of Cambridge.

Project Guidelines, Requirements, Timescale and Reporting

The project should challenge first year PhD mathematics students who have a four-year mathematics degree or a three-year degree plus a Master's degree in mathematics.

- A project description is required using the submission template, which includes the background, problem, aims, expectations and key literature references.

- All project proposals will be subject to approval by the CMI Directors.

- The students have an external supervisor from the partner organisation (usually the person who writes/submits the project) and a Mathematics Faculty co-supervisor. The level of supervision from the external supervisor is likely to be minimal.

- The students select a project of their choice from a compilation of project descriptions.

- We will inform you by mid-December 2020 whether or not a student has chosen your project. If a student does not select your project, you may request it to be included the summer Cambridge Mathematics Placement programme (contact sn468@cam.ac.uk for more information).

- The students undertake the project research between December 2020 and mid-March 2021. Students manage their own time and fit the project in with other academic commitments - the overall amount of time spent is 4-6 weeks.

- On completion, the students write a report of around 10 pages. At the end of March 2021, the students will give a talk on their project to their fellow students, external supervisors and academics.

- Projects will not continue once completed beyond March 2021. Please let us know if you would like further research and we can discuss ways to accomplish this.

- No funding is required as the external project is an integral part of the training.   Partner organisations will be required to cover incidental costs if needed, for example student travel.

- We appreciate feedback on the outcome and any impact resulting from the project.

Terms and Conditions

- Submission of proposals for projects indicates the sponsor's consent to the standard project terms and conditions, as attached hereto.

- We advise that sponsors strongly consider the nature of the research environment when providing background information for projects that may be of a confidential or sensitive nature. The University is unable to provide extensive measures to protect sensitive information.

- Projects are to be considered academic in nature and any inventions or other intellectual property generated by a given project will be wholly owned by the student. External partners shall be given the results of a project for internal research purposes only, and the acquisition of any other intellectual property rights by a sponsor shall be at the discretion of the student.

- The University will not allow students to undertake personal exposure to commercial liability while working on the projects.

Project Submission Process

Please send proposals using the template no later than 5pm on the closing date of Friday 13 November 2020 to Dr Stephanie North, Knowledge Transfer Facilitator, sn468@cam.ac.uk and Tessa Blackman, CMI Group Secretary cmi@maths.cam.ac.uk.