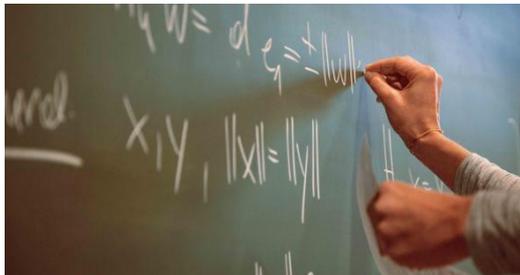
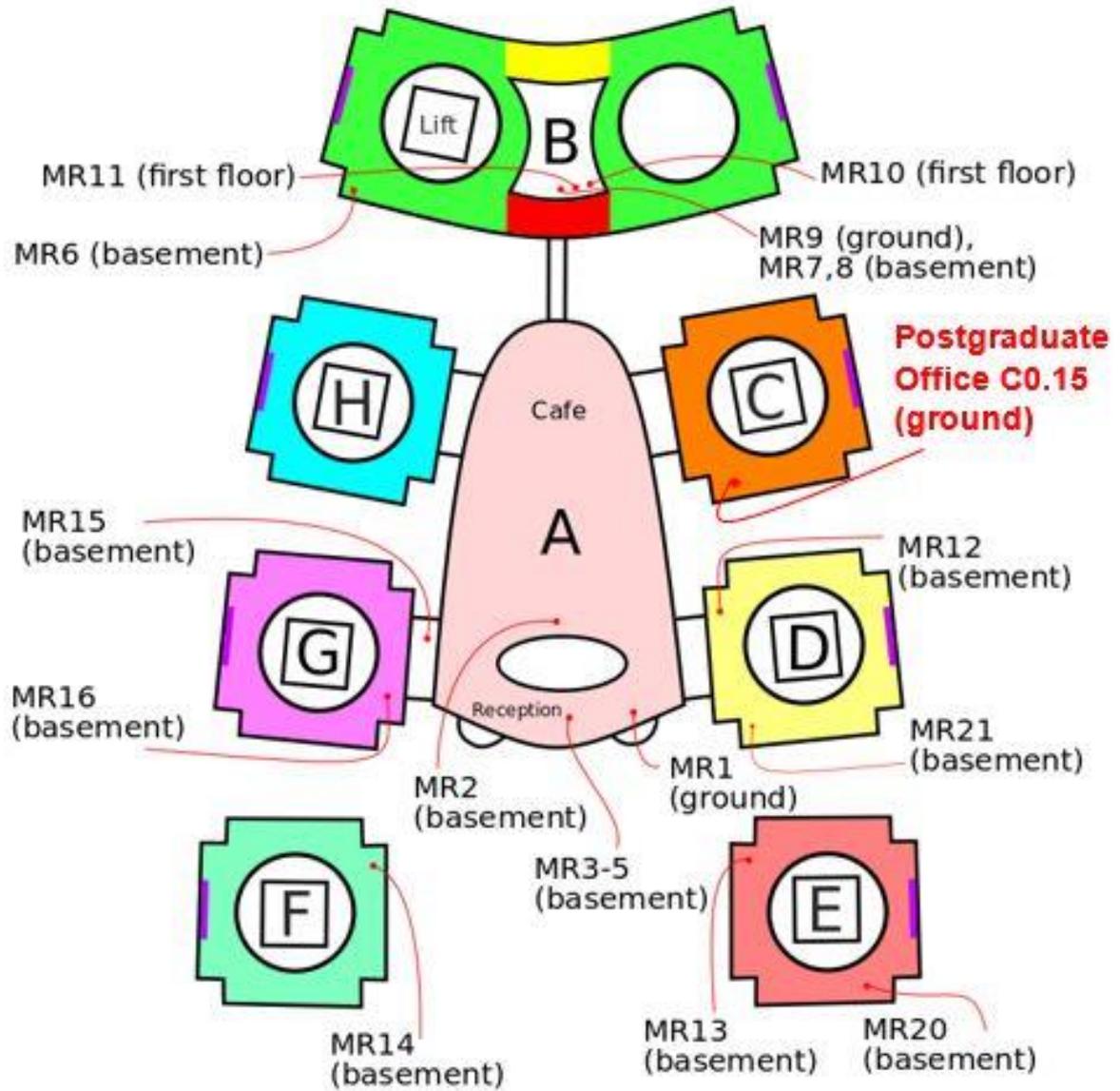

Cambridge Mathematics of Information

PhD Student Handbook
October 2022



Centre for Mathematical Sciences
Wilberforce Road, Cambridge



Access to MR1-5, MR13-16 is via reception in Pavilion A; disabled access is via lift in Pavilion D.



All pavilions except A have one lift each, marked above with squares.



Contents

Welcome to Cambridge Mathematics of Information	4
1. Supervision	5
1.1 First year supervision	5
1.2 Continuation or change of supervisor after first year	5
1.3 Research diary and training log.....	5
1.4 Advisers.....	6
2. First year programme.....	6
2.1 Initial research project	6
2.2 External research project	7
2.3 Supplementary Part III courses	7
2.4 CMI core courses	7
2.5 Industry seminars	8
2.6 CCIMI seminars and events	8
2.7 Introduction to research computing	8
2.8 First-year review	8
3. Year two to year four	9
4. Conference travel and research visits	9
4.1 Application, approval and reimbursement	10
5. CMS and covid-19	10
6. Important Dates	10
Appendix: Code of Practice for Research Students.....	1

Welcome to Cambridge Mathematics of Information

We take pleasure in welcoming you as a PhD student in Cambridge Mathematics of Information (CMI).

This Handbook contains useful information about your course but is not exhaustive. If there is anything you want to know, do ask one of us, or the Postgraduate Office cmi@maths.cam.ac.uk

This handbook should be read in conjunction with the [Faculty's 'Research Student Handbook'](#). We also draw your attention particularly to the [Centre for Mathematical Sciences Site Safety Policy](#) and to the [Appendix: Code of Practice for Research Students](#).

We suggest that you plan to arrive in Cambridge the weekend before the beginning of term. On arrival at the Centre for Mathematical Sciences, ask at Reception for the Postgraduate Office which is based in C0.15.

The First Year Briefing is on **Wednesday 5 October 2022 at 11.30am** with a photo at **3.15pm**. We suggest that you contact your First Year Supervisor prior to your arrival to arrange an initial meeting. Lecture courses begin on **Thursday 6 October 2022**.

We look forward to meeting you.

Randolf Altmeyer
Hamza Fawzi
Richard Nickl
Carola-Bibiane Schönlieb

1. Supervision

The role of your Supervisor is set out in the [University's 'Code of Practice for Research Students'](#), which applies to all students undertaking research degrees, including CMI. A summary is provided in [Appendix](#). This section describes some CMI specific aspects of your supervision arrangements.

1.1 First year supervision

On admission to CMI each student is assigned a First Year Supervisor from the Faculty of Mathematics. Your First Year Supervisor will set you an Initial Research Project, which will run throughout the first year and which will lead to a report (around 30 pages) and presentation at the end of Easter Term. They will also direct your studies, including advising on any course choices, and will report on your progress to the University and to the CMI Co-Directors. Your Supervisor may also recommend your attendance at particular research seminars or study groups relevant to your Project. You should contact your Supervisor to arrange an initial meeting, ideally before the start of lectures in Michaelmas Term.

It is intended that CMI students can use their first year to explore several options for PhD study. If you are keen to do this, you should discuss it with your First Year Supervisor in your initial meeting. They may then be able to adapt your Initial Research Project and choice of Supplementary Courses to give you a broader experience of research in your first year. For some students, the External Project offers a further route towards PhD supervision in another Department of the University or in industry. Or, you may wish to press on in your chosen research area, in which case your Initial Research Project will reflect this.

If, as the year progresses, your preferred research area moves away from your First Year Supervisor, then it is your responsibility to approach other potential supervisors. The CMI Co-Directors are available for consultation.

1.2 Continuation or change of supervisor after first year

In most cases, your First Year Supervisor will have recommended your admission to CMI. You can expect that, provided your work in the first year is satisfactory, they will be willing to act as your PhD Supervisor. While, in many cases, students will continue with their First Year Supervisor for the PhD, it is equally acceptable to move to a new PhD Supervisor, and indeed this is an intended flexibility in CMI, allowing you to choose the area for your PhD thesis on the basis of your experience in the first year. Students who wish to change supervisor should ask potential supervisors about their likely availability as soon as possible, since all supervisors have a limited capacity and some may not be able to take new students in a given year.

At the end of your third term, following the First Year Review and Registration for the PhD, you will be assigned a PhD Supervisor. Your PhD Supervisor may be from the Faculty of Mathematics, or another Department of the University, or from a CMI Industrial Partner. If your PhD Supervisor is from another Department, you will be assigned a Second Supervisor from the Faculty of Mathematics. If your PhD Supervisor is from industry, you will be assigned a University Supervisor from the Faculty of Mathematics.

Your Supervisor will report termly to the University and to the CMI Co-Directors on your progress.

1.3 Research diary and training log

Your Supervisor may require you to maintain a Research Diary, as a record of objectives and outcomes in your research. This is regarded as good practice in CMI and may conveniently be combined with keeping a Training Log, as required for your First- and Second-Year Reviews.

1.4 Advisers

The University requires that you have also an Adviser, who is an alternative point of contact to your Supervisor. Your Adviser will initially be one of the CMI Co-Directors. Depending on the subject of your PhD, you may wish to request at a later stage that your Adviser be changed to someone whose research area is closer to your own. Such changes must be communicated to the Postgraduate Office.

2. First year programme

The first-year programme at CMI is intensive and demanding and comprises the following components:

Compulsory components:

- An initial research project,
- **Either** an external research project **or** two supplementary Part III courses
- Three CMI core courses
 - Mathematics of Information
 - Probability and Partial Differential Equations
 - Applied and Computational Analysis

Students are also expected to regularly attend:

- Industry seminars
- CCIMI seminars and events
- Introduction to Research Computing course

The first-year programme concludes with a **mandatory** review meeting. As part of this review you are required to submit a training log of activities undertaken throughout the year.

All work must be submitted via email to cmi@maths.cam.ac.uk

Teamwork within the first-year cohort is an intrinsic aspect of the programme, and you will need to be available in order to contribute fully. Details of events that you will need to attend 'in person' are given in Section 6 of this handbook and are listed in the CCIMI Google Calendar.

You are asked to agree any periods of absence, which should be during University vacations, with your supervisor. Absences of more than 14 days must be approved by the University regardless of when they occur in the year, and you must apply in advance for permission to be away. See '[Conference Travel and Research Visits](#)'.

2.1 Initial research project

You will work throughout the year under the direction of your First Year Supervisor on an initial research project. This is a mandatory component for all students, and the form and the content of this will be determined by your supervisor. Work on the project should amount to the equivalent of three months solid work, but will be spread through the year, taking account of other components of the CMI programme.

The initial research project will be assessed through:

- a (LaTeXed) report on the project (~30 pages) written by you **to be submitted by 31 May**
- a 30-minute presentation on the project delivered by you to the first-year CMI cohort on **5 or 6 June**.

- a report from your supervisor.

A second-year CMI student will act as 'rapporteur' on your presentation. The Directors can also provide feedback if required.

2.2 External research project

You must undertake **either** an external research project, **or** two supplementary Part III courses (see below). The external research project, if chosen, is undertaken in Michaelmas and Lent term. A booklet of project descriptions will be available in late **November**. Usually each listed project will only be available to a single student. Each project will come from a CMI partner organisation, either in industry or in another University department. You will have a supervisor in the partner organisation for the duration of the project. There may be an internal contact from the Faculty of Mathematics who will also be available for initial discussion as you explore which project to undertake.

You will need to send project preferences to cmi@maths.cam.ac.uk in **early December** (date TBC). You should have initiated the project by meeting your external supervisor by the beginning of January at the latest. Your work on the project should be equivalent to about one month's solid work (i.e. about 160 hours in total).

The external research project will be assessed through:

- a report on the project (~10 pages) written by you **to be submitted by 17 March**
- a 20-minute presentation on the project delivered by you to the first-year CMI cohort on **20 March**
- a short feedback report from your supervisor

A second-year CMI student will act as 'rapporteur' on your presentation.

2.3 Supplementary Part III courses

If you do not undertake an External Project you must offer, for oral examination (of approximately one hour), two courses from Part III. You should discuss and agree your choices for oral examination with your First Year Supervisor, who will advise whether you should take any of the priority courses and will guide your choice of any further courses. Please inform the CMI Secretary CMI@maths.cam.ac.uk of your choices by late November (exact date TBC).

2.4 CMI core courses

There are three core courses in 2022/23, to be taken by all first-year CMI students. They each follow a similar pattern of reading assignments and projects done in student teams, leading to write-ups and presentations to the whole cohort. Subject Coordinator(s) are listed in brackets below and take overall responsibility for the course, which will also involve supervision by other teaching officers and post-docs.

Mathematics of information (R. Altmeyer, H. Fawzi and R. Nickl, Michaelmas Term)

The course comprises three meetings throughout Michaelmas, in reading group format, where students prepare presentations to everyone on selected papers across the spectrum of maths of information.

- 5 October after Induction: Briefing meeting
- 22 and 29 November 1.00-5.00pm: Project presentations

Probability and partial differential equations (J. Miller and J. Norris, Michaelmas Term)

Students are expected to attend or otherwise be familiar with the content of the [Part III course Advanced Probability](#), which runs in Michaelmas Term.

- 12 October 2-3pm: Briefing meeting
- 23 and 25 November 2.00-6.00pm: Project presentations

From Computation to Information (H. Fawzi, M. Colbrook, Lent Term)

- Briefing meeting and presentations will take place in Lent term. Exact dates TBC.

Subject Coordinators may offer feedback on the assignment write-ups and presentations, including the success of team-working, to be considered as part of the first-year review.

2.5 Industry seminars

DAMTP and DPMMS run a joint programme of industry seminars, some of which are given by CMI industry partners. You are strongly encouraged to attend and will be expected to state in your training log which Industry Seminars you have attended.

2.6 CCIMI seminars and events

CCIMI seminars are run regularly throughout the year and cover a variety of topics. In addition, a series of short courses are arranged on subjects of particular interest to CCIMI members. If there is a particular topic or speaker that is of interest you can suggest speakers to invite.

The CCIMI runs two conferences annually, which CMI students are expected to attend and are encouraged to actively participate in by submitting posters and giving talks. During Michaelmas there will also be a Research Jam, held in collaboration with GAM Systematic. This event brings together CCIMI students with GAM researchers to share knowledge and discuss research.

There are two CMI colloquia currently organised in the afternoon of the following dates (exact times/locations TBC):

7 October	Victor Chernozhukov (MIT)
28 April	Helmut Bölcskei (ETH Zurich)

All students are expected to attend.

2.7 Introduction to research computing

During Michaelmas term the department runs an optional Introduction to Research Computing Course but you are encouraged to attend if you would like to refresh these skills. Alongside this course, a mandatory session is delivered by GAM Systematic and looks at collaborative coding and code sharing through practical examples. This session will take place in late November and you will be expected to attend. Further information will be circulated with final details.

2.8 First-year review

You will have a first-year review with the CMI Co-Directors on 15 or 16 June.

The Co-Directors will consider:

- reports from your First Year Supervisor on your initial research project,
- **either** a report from the supervisor of your external project, **or** reports of your oral examinations on two Part III courses, as is applicable in your case,
- reports from Subject Coordinators on the CMI core courses
- your training log.

Your training log and a statement on what has been agreed regarding your PhD supervision must be submitted by **12 June**. The training log should be a short factual statement prepared by you of your training and research activities since admission.

If all aspects of your progress are satisfactory, the Co-Directors will recommend your registration as a PhD student, and will arrange, if required, your transfer to your PhD Supervisor.

Please see the [Appendix](#) for procedures relating to unsatisfactory progress.

3. Year two to year four

As CMI students, you have a unique opportunity through your broad education in Analysis and the network of the CMI cohorts to bring ideas from one area of Analysis into another, and into applications. We strongly approve of collaborative research spanning different branches of Analysis, involving CMI students with different areas of expertise.

You are expected to work under the direction of your PhD supervisor. In particular, you should discuss with your supervisor expectations concerning place of work and periods of absence. While your main focus should be on working towards your PhD, you are expected to contribute to and take advantage of wider CMI activities.

CMI-specific activities in years two to four include:

- mentoring of CMI first-year students (by second-year students)
- S³ seminar (a postgraduate student seminar run by CMI second-years)
- student-run reading groups
- industry seminars
- occasional CCIMI-sponsored short courses
- a careers briefing for third-year students in Easter Term (run by the Co-Directors)
- CCIMI research jam – students and researchers give 5 minute ‘flash’ talks
- CCIMI video contest.

There are further training opportunities, run by DPMMS, DAMTP and others, which you are also encouraged to take up as appropriate, including:

- training for undergraduate supervisors
- Smith-Knight and Rayleigh-Knight Prize Essay competitions
- training in public engagement and outreach.

Second year CMI students have a review meeting with their PhD Supervisor and a CMI Co-Director in **June**. The purpose of the review is to reflect on your progress in your first full year of research. Ahead of the review meeting you will be asked to submit:

- your training log, covering the period since your first-year review
- copies of research papers completed while a CMI student and / or work in progress.

The process used specifically to address unsatisfactory progress follows the [University's Code of Practice for Research Students](#).

4. Conference travel and research visits

CMI students are encouraged to participate in conferences, workshops and research schools, where these are relevant to their intended research projects. On the recommendation of your supervisor, funds are available to meet expenses. You are expected to use economical modes of travel and to seek alternative sources of financial support where available.

A rough guide is that £750 per year may be available to each student, which can be carried forward if unspent in any given year. Longer research visits may be recommended by your supervisor towards the end of your course, so you should consider keeping funds in reserve for this.

4.1 Application, approval and reimbursement

You must apply and secure approval for CMI support well in advance of travel, using the pre-travel application form available from the [Maths Current Student webpages](#). Expenses can only be reimbursed against receipts, which you should submit with the completed claim form (also available on the webpage). As part of this process you must undertake an appropriate risk assessment. Further guidance on this is also available on the website.

Completed forms applying to spend funds or expenses forms for reclaiming costs should be submitted to the CCIMI administrator, Paula Smith (ccimi@maths.cam.ac.uk).

The University provides free travel insurance for academic travel, which you can apply for online. Details are available from the [University Insurance website](#).

Trips of fourteen days or more (excluding holidays) require approval from the University and you must submit a [Work Away application to include an appropriate risk assessment](#).

5. CMS and covid-19

The Centre for Mathematical Sciences is currently fully open but measures are still in place to reduce respiratory communicable disease transmission. You can access our current workplace protocol on the [Faculty Covid-19 webpage](#). Any changes will be communicated by email. Students will be expected to comply with any new guidance or protocols put in place in order to minimise the risks of respiratory illnesses such as Covid-19 within the CMS.

6. Important Dates

The following timeline sets out the key dates for your first year at CMI. It is particularly important that you take note of deadlines to appropriately plan your workload, and presentation dates to ensure that you are available to deliver them in person.

Dates are also listed in the CCIMI Google Calendar.

Date	Time	Event	Location
Michaelmas Term			
5 October	11.30am – 1.30pm	CMI Induction Core Course Briefing: Mathematics of Information	MR14
	3.15pm	CCIMI Photo	In front of CMS
7 October	4pm	CMI Colloquium: Victor Chernozhukov (MIT)	MR12
12 October	2-3pm	Core Course Briefing: Probability and PDEs	MR14

22 November	1-5pm	Core Course Presentations: Mathematics of Information	MR9
25 November	2-6pm	Core Course Presentations: Probability and PDEs	MR9
28 November	2-6pm	Core Course Presentations: Probability and PDEs	MR9
29 November	5pm	Core Course Presentations: Mathematics of Information	MR9
Lent Term			
TBC	TBC	Core Course Briefing + Presentations: From Computation to Information	TBC
17 March	By noon	External Project: written work submission deadline	n/a
20 or 21 March	TBC	External Project: presentations	TBC
Easter Term			
28 April	TBC	CMI Colloquium: Helmut Bölcskei (ETH Zurich)	TBC
31 May	n/a	Initial Research Project: written work submission deadline	n/a
5 or 6 June	TBC	Initial Research Project: presentations	TBC
12 June	n/a	Research Development Log and supervision info submission deadline	n/a
15 or 16 June	TBC	End of year reviews	TBC

Appendix: Code of Practice for Research Students

CMI follows the [University of Cambridge Code of Practice for Research Students](#). This Appendix sets out details of the implementation of the Code of Practice specific to CMI. It should be read in conjunction with the Code of Practice.

As a CMI student, you are either a member of the Department of Applied Mathematics and Theoretical Physics (DAMTP) or of the Department of Pure Mathematics and Mathematical Statistics (DPMMS). The two Departments together form the Faculty of Mathematics. The Director of Postgraduate Education for your Department has delegated responsibility for the oversight of your course to the Co-Directors of CMI.

On admission to CMI, you are assigned either to DAMTP or to DPMMS, and to a First Year Supervisor in the same Department. The course is identical for students assigned to DAMTP and DPMMS. At the end of the First Year, you are assigned a PhD Supervisor, who may or may not be the same person as your First Year Supervisor. If your PhD Supervisor is from the other Department, you normally also change Department. If your Supervisor is from another Faculty or from industry, you also have a Second Supervisor or University Supervisor, either from DAMTP or DPMMS, and you are a member of that Department. Your First Year and PhD Supervisors are responsible for setting the scientific direction of your studies and for advising you on academic good practice and presentation of your work. In the first and second years, the normal expectation is that you meet your Supervisor at least once per week and that your Supervisor gives you regular feedback based on the progress of your work. The nature of the meetings will vary, from a brief report by you that work is proceeding as planned, to longer sessions of agenda setting and reviews of what you have achieved. After that, you meet your Supervisor as often as needed for good progress.

In the event that your Supervisor finds your work or progress to be unsatisfactory at any stage, he or she would in the first instance warn you, at the same time notifying the CMI Co-Directors. If the problem persists, your Supervisor would follow the process described in the University Code of Conduct.

You are also assigned an Adviser. Initially, this is the CMI Co-Director from your Department, unless that person is your First Year Supervisor, in which case it will be the other Co-Director. At a later stage, you may switch Adviser to someone closer to your subject area. Any such change must be communicated to the Postgraduate Office. For the sake of proper expertise, your Adviser may in some cases also be the Internal Examiner for your PhD -- to avoid possible conflict of interest, you should not normally conduct joint research with your Adviser.

Article 49 in the University Code of Practice applies to you with the following modification. You are expected to complete the research for your degree within four years of admission and to submit your dissertation also within four years.

There is no qualification resulting from the CMI First Year.

The form of the progress examination leading to registration for the PhD at the end of the First Year is specific to CMI. You have a First Year Review with the Co-Directors of CMI at the end of the third term. The Co-Directors consider:

- reports from your First Year Supervisor on your Initial Research Project and from the supervisor of your External Project
- reports from Subject Coordinators on the First Year Core Courses
- reports of your oral examinations on two Part III courses
- your Training Log.

In the event that progress in any aspect is unsatisfactory, the grounds for this would be explained, Registration and assignment of your PhD supervisor would be deferred, and a remedial target would be set to be achieved by the beginning of the fourth term. Where a further Review by the Co-Directors determined that the target had not been met, they would normally recommend to the Degree Committee that you leave the course.