MPhil in Computational Biology Handbook 2017-2018
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1. **Introduction**

The MPhil in Computational Biology has been developed by the Cambridge Computational Biology Institute (CCBI) and is run by the Department of Applied Mathematics and Theoretical Physics (DAMTP) at the Centre for Mathematical Sciences (CMS). DAMTP is one of two departments in the Faculty of Mathematics; the other being the Department of Pure Mathematics and Mathematical Statistics (DPMMS). The Faculty is part of the School of Physical Sciences.

DAMTP is an unusually large department for its discipline with currently around 50 academic staff, about 85 postdoctoral staff and about 110 research students, supported by about 30 administrative, technical and secretarial staff. There are also around 250 students undertaking the Part III (MMath/MASt) degree which is run jointly by both DAMTP and DPMMS.

The MPhil is based at the Centre for Mathematical Sciences in Clarkson Road, where there are lecture theatres, common rooms and a student computing room.

This handbook provides administrative and other important information for MPhil students. In addition to this handbook there is a Moodle site which is the main repository for all materials, documentation and coursework submissions. Students will automatically be given access to both at the start of the academic year. See Section 3 – General Administration and Section 9 – Assessment and Examination for further information.

Coursework submission site on Moodle: https://www.vle.cam.ac.uk/course/index.php?categoryid=6181

2. **Key Contacts 2017-18**

**Course Directors**
- Professor Simon Tavaré (G0.06, 60420)
- Dr Stephen Eglen (G0.11, 65761)
  Email: ccbi-mphil-directors@damtp.cam.ac.uk

**Director of CCBI**
- Dr Gos Micklem (G0.08, 60447)

**Module Leaders**
- Dr Oscar Rueda (Functional Genomics)
- Dr Gos Micklem (Genome Informatics)
- Dr Aylwyn Scally (Genome Sequence Analysis)
- Dr Stephen Eglen (Scientific Programming)
- Dr Stephen Eglen (Computational Neuroscience)
- Dr Chris Illingworth (Population Genetics)
- Dr Stephanie Reichelt (Biological Imaging and Analysis)
- Dr Lorenz Wernisch (Network Biology)
- Dr Florian Markowetz (Cancer Evolution)

**MPhil Students**
- Maths-cbmphil-students@lists.cam.ac.uk
  All MPhil students are subscribed to this list (see Section 15).

**Course Administrator**
- Graduate Office (C0.15, 37966)
  Email: compbiomphil@maths.cam.ac.uk
3. General Information

Induction and preliminary courses
At the start of the year you will be invited to attend an Induction Meeting in which administrative and other information about the course will be distributed. This year the meeting will take place on Monday 2nd October 2017. All students are required to attend this meeting. The Introduction to Molecular Biology will commence on Tuesday 3rd October and Introduction to Unix on the afternoon of Wednesday 4th October. A timetable will be circulated. If you are unable to attend this meeting for any reason, you must let the Course Administrator know.

Lectures
Most lectures will take place during University terms with lectures commencing on the first Thursday of full term (see Section 4 – Calendar for dates). Occasionally lectures may be scheduled outside of full term. Lectures are held in the Centre for Mathematical Sciences (CMS) unless otherwise stated. The timetable will be circulated at the start of term and provided at the Induction Meeting. It is also published on the Course Moodle and the Faculty’s website at www.maths.cam.ac.uk/lecturelists/. Any changes to the published timetable will be circulated to students by email at the earliest opportunity.

The use of audio/visual recording equipment (e.g. ipods, cell phones) in lectures is not permitted without the prior consent of the lecturer. If you have a particular need to record lectures, other than taking notes, please contact the Course Administrator.

Moodle
All students and staff associated with the MPhil course will be given access to the Course Moodle at the start of the year. Moodle is the main repository for course materials and documentation.

Weekly seminar and tea
During Michaelmas and Lent terms a weekly seminar is held every Wednesday, 2-3pm in MR4. The seminars are not assessed, but are compulsory and you are expected to attend each week. A programme of speakers and their topics will be posted on Moodle. The seminar is followed by a weekly tea in the Pavilion G common room. This is a chance for you to meet informally with each other, speakers and members of staff.

The aim of the seminar is to provide students with potential opportunities and resources that may not be provided by the taught modules. In particular the seminars provide an opportunity to meet local researchers who may well have research positions they want to fill, be it summer internships or PhD posts. Each week a researcher from Cambridge (either within the University, related academic sites or from local industry) will speak about their research. We aim to invite a diverse range of speakers from across the spectrum of Computational Biology to demonstrate the wide range of application areas, and we will ask for students to volunteer to host the speakers.

Residence
The MPhil is a full-time course which runs from October to the end of August. The last day of the course is 31st August. During term time students are expected to be resident in Cambridge. They may also be expected to participate in activities outside of term (which are principally set for the delivery of undergraduate programmes). Students should note that it is a requirement of the MPhil degree that they are resident in Cambridge for three terms. To keep residence they must attend for a certain number of days in each term. In order to meet the requirement for Easter, students whose internship is to be held outside of Cambridge must spend 53 nights in Cambridge between 10th April and 18th June (unless Full Term begins after 22nd April, in which case between 17th April and 25th June). You may also need to apply formally for Leave to Work Away from the University. Please discuss this with the Course Administrator if you are uncertain if you will meet the requirement.
**Course representative**
Once you have had time to get to know one another we will ask you to elect a fellow student as a course representative. The role of the course representative is to provide feedback to us on any issues regarding the course, such as coursework and teaching. Further information will be circulated.

**Student Progress**
Each student will have the opportunity to meet individually with the Course Director once a term to discuss his/her progress. Information on how and when to sign-up for a meeting will be circulated. Further guidance on what to do if you encounter problems or difficulties can be found in *Section 10 – Resolving difficulties*.

**Student Feedback**
We encourage feedback from students on all aspects of the course. This helps us assess how well the course is running, and will help us to correct any current limitations. An online feedback questionnaire will be circulated at the end of each term asking for your feedback on the modules offered. All feedback is anonymous and you are encouraged to complete the questionnaire. The questionnaire responses will be sent to the relevant lecturers and to the Course Directors for consideration.

In addition to this formal mechanism, we also encourage informal feedback at any time. Your comments regarding the course will be highly valuable to us in evaluating the content and direction of the course. As this area of computational biology is rapidly evolving, we expect to evaluate the content yearly to ensure that our students receive the best education possible in this field.

**Course Administration**
The Course Administrator is the main administrative contact for the MPhil (see *Section 2 - Key Contacts*). Any general questions you may have about the course should be directed to the Course Administrator in the first instance. The Course Administrator is part of the Mathematics Graduate Office team which is based in C0.15. In the Course Administrator’s absence please do not hesitate to contact any member of the team for assistance.
### 4. MPhil Calendar 2017/18

<table>
<thead>
<tr>
<th>October</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon 02</td>
<td>Induction 11:00-12:30pm, MR15&lt;br&gt;Lunch 12:30 – 13:15, Pavilion G Common Room</td>
</tr>
<tr>
<td>Tue 03</td>
<td>Full Michaelmas term begins&lt;br&gt;Introduction to Molecular Biology, 10:00-12:00, MR15</td>
</tr>
<tr>
<td>Wed 04</td>
<td>Introduction to Molecular Biology, 10:00-12:00, MR15&lt;br&gt;Introduction to UNIX, 12:30 – 13:45, MR16</td>
</tr>
<tr>
<td>Thur 05</td>
<td>Michaelmas term teaching week 1 begins&lt;br&gt;Introduction to Molecular Biology, 10:00-12:00, MR15</td>
</tr>
<tr>
<td>Wed 11</td>
<td>Seminars and weekly tea commence</td>
</tr>
<tr>
<td>Wed 18</td>
<td>Deadline for submission of Turnitin acknowledgment form (online) (4pm)</td>
</tr>
<tr>
<td>November</td>
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<tr>
<td>Tues 28</td>
<td>1-to-1 meetings with Course Director this week</td>
</tr>
<tr>
<td>December</td>
<td></td>
</tr>
<tr>
<td>Fri 01</td>
<td>Full Michaelmas term ends</td>
</tr>
<tr>
<td>January</td>
<td></td>
</tr>
<tr>
<td>Tue 16</td>
<td>Full Lent term begins</td>
</tr>
<tr>
<td>Weds 17</td>
<td>Internship meeting</td>
</tr>
<tr>
<td>Thur 18</td>
<td>Lent term teaching week 1 begins</td>
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<tr>
<td>Wed 24</td>
<td>Seminars and weekly tea commence</td>
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<tr>
<td>March</td>
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<tr>
<td>Fri 16</td>
<td>Full Lent term ends&lt;br&gt;Students will be notified of which modules are to be examined in the general examination by the end of Lent Term</td>
</tr>
<tr>
<td>April</td>
<td></td>
</tr>
<tr>
<td>Tue 24</td>
<td>Full Easter term begins</td>
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<tr>
<td>Thur 26</td>
<td>Easter term teaching week 1 begins</td>
</tr>
<tr>
<td>May</td>
<td></td>
</tr>
<tr>
<td>Fri 04</td>
<td>Deadline for submitting internship project titles/arrangements (4pm)</td>
</tr>
<tr>
<td>Fri 11</td>
<td>MPhil General Written Examination (2-4pm)</td>
</tr>
<tr>
<td>Mon 14</td>
<td>Internships begin</td>
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<tr>
<td>June</td>
<td></td>
</tr>
<tr>
<td>Fri 15</td>
<td>Full Easter Term ends</td>
</tr>
<tr>
<td>August</td>
<td></td>
</tr>
<tr>
<td>Wed 08</td>
<td>Deadline for submission of internship reports (4pm)</td>
</tr>
<tr>
<td>Mon 13</td>
<td>Deadline for submission of internship presentation files (4pm)</td>
</tr>
<tr>
<td>Wed 15 – Fri 17</td>
<td>MPhil Presentations (TBC)</td>
</tr>
<tr>
<td>Fri 17</td>
<td>MPhil Oral Examinations where applicable</td>
</tr>
<tr>
<td>September</td>
<td></td>
</tr>
<tr>
<td>Fri 07</td>
<td>MPhil Examiners Meeting (TBC)</td>
</tr>
<tr>
<td>Thur 20</td>
<td>Degree Committee Meeting</td>
</tr>
<tr>
<td>October</td>
<td></td>
</tr>
<tr>
<td>Sat 20</td>
<td>First available congregation for those graduating</td>
</tr>
</tbody>
</table>
5. Course Structure and Requirements

The modules to be offered in 2017-18 are as set out below. Candidates for the degree must offer all taught modules for examination, except that in Lent Term there is a choice between two half modules. All taught modules are assessed by coursework assignment. Normally students will be set two or three assignments for each module. Please see course outlines for details of forms of assessment. In addition, students sit a two-hour general examination in the Easter Term on the material taught within the modules. Students are also required to complete an internship project which is assessed by a report of no more than 18,000 words and a presentation. At the discretion of the Examiners, students may be required to attend an oral examination (see Section 9 – Assessment and Examination).

The weighting for the examination in Computational Biology is out of 12, divided as follows: each module is weighted at 1, and half modules at 0.5, meaning a total weighting of 8 for the taught modules. The general examination is weighted at 1. The internship project is weighted at a total of 3, with 2.5 for the report and 0.5 for the presentation.

<table>
<thead>
<tr>
<th>Term</th>
<th>Module</th>
<th>Abbreviation</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michaelmas</td>
<td>Functional genomics</td>
<td>FG</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Genome informatics</td>
<td>GI</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Scientific programming</td>
<td>SP</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Genome sequence analysis (half module)</td>
<td>GSA</td>
<td>0.5</td>
</tr>
<tr>
<td>Lent</td>
<td>Cancer evolution</td>
<td>CE</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Population genetic analysis of genomic data</td>
<td>PG</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Computational neuroscience</td>
<td>CN</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Either</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Network biology (half module)</td>
<td>NB</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>or Biological Imaging and Analysis (half module)</td>
<td>BI</td>
<td>0.5</td>
</tr>
<tr>
<td>Easter</td>
<td>Systems biology</td>
<td>SB</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>General Examination</td>
<td>EX</td>
<td>1</td>
</tr>
<tr>
<td>Summer</td>
<td>Internship Report</td>
<td>IR</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Internship Presentation</td>
<td>IP</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

Module Choices

Most modules in the MPhil are compulsory. However, in Lent term students may choose to take either Network Biology or Biological Imaging and Analysis. Whilst students may attend lectures for any of these courses if they wish, they may only be formally examined for one of these two modules. The University sets the date by which students must make their choices and be formally enrolled for assessed modules. At the time of going to print this date has not been confirmed. Students will be informed by the Course Administrator of when they need to confirm their choices as soon as this information has been confirmed.
6. Taught Modules 2017-18

The following information provides a summary for each module offered in the current academic year. More detailed information will be provided by the module leader and lecturers as part of the course. Course materials and lecture notes will be uploaded by lecturers direct to the Course Moodle for students to access.

Michaelmas Term

Functional Genomics (FG)
Dr Oscar Rueda, Dr Rory Stark, Dr Maurizio Callari, Dr Geoff Macintyre and Rajbir Batra (Cancer Research UK Cambridge Institute), Dr Ernest Turro (Department of Haematology), Dr Shamith Samarajiwa (MRC Cancer Unit).

Functional genomics looks at the dynamic aspects of how the genome functions within cells, particularly in the form of gene expression (transcription) and gene regulation. This class surveys current methods for functional genomics using high-throughput technologies. We cover all stages of the experimental workflow: experimental design and planning, pre-processing and quality control, normalization, differential expression, clustering, classification and survival analysis. We present workflows for the processing, quantification, and downstream analysis of microarrays, RNA-seq, CHiP-seq and methylation data as well as approaches that seek to integrate different data types.

Assessment: Three assignments, weighted 30:30:40. The first two consist of an individual paper answering questions related to the lectures and practicals done during the course. The third assignment (40% of the final mark) has a group component (reproduce the analysis) and an individual component (extend the analysis). Students will be required to write a report and present the results in a 1 hour session. There will be a feedback session at the end of the course.

Genome Informatics (GI)
Dr Gos Micklem (DAMTP/ Department of Genetics)


Assessment: Three assignments, weighted 20:40:40. The first and third assignments will be individual and assessed by written report, while the second will be a group assignment assessed by presentations.

Scientific Programming with R
Dr Stephen Eglen (DAMTP)


Assessment: Three individual assignments. There will be a feedback session for each assignment after it is marked.
**Genome Sequence Analysis (GSA)**
Dr Aylwyn Scally (Department of Genetics)
The course will introduce hidden Markov models, their properties, implementation and application to some important problems in bioinformatics and genomics. Topics: probabilistic models; Markov chains; hidden Markov models; inference with HMMs; the Viterbi algorithm; Baum-Welch training; sequence alignment.

*Assessment:* A practical assignment in which students are required to implement and apply a computational HMM to genome sequence data and interpret its output.

**Lent Term**

**Cancer Evolution (CE)**
To follow

**Population Genetic Analyses of Genomic Data (PG)**
Dr Chris Illingworth (Department of Genetics), Dr Aylwyn Scally (Department of Genetics), and Dr Richard Durbin (Welcome Trust Sanger Institute)

*Assessment:* Two written individual assignments, together comprising the whole of the mark for the course.

**Computational Neuroscience (CN)**
Dr Stephen Eglen (DAMTP) and Dr Rafael Romero-Garcia (Department of Psychiatry)
1, 2. Introduction/Single neurons
3, 4. Short and long term memory/associative networks
5, 6. Complex brain networks
7, 8. Structure and dynamics networks
9, 10. Supervised learning
11, 12. Reinforcement learning
13, 14. Unsupervised learning
15, 16. Development of the nervous system

*Assessment:* Two individual assignments, weighted evenly. There will be a feedback session for each assignment after it is marked.

**Biological Imaging and Analysis (BI)**
Dr Stefanie Reichelt (CRUK CI) and Carola-Bibiane Schönlieb (DAMTP)
Imaging Biological Processes has been revolutionized through the development of fluorescent probes and imaging systems which allow the observation of specific molecules and cell populations in time and within a whole organism. Before applying image analysis algorithms and mathematical analysis to biological questions, it is essential to understand the acquisition methods and also the biological questions. This course aims to teach the students what are the imaging systems, what the samples are and how can we label and detect specific probes.
Moreover, basic concepts of image analysis and some of its main methodologies such as image de-
noising, object segmentation and tracking will be introduced and their practical implementation in 
MATLAB explained. Particular topics discussed will be:

1. Imaging Modalities in Biology: Challenges and Tricks
2. Contrast in Imaging: Interference, Phase Contrast and Fluorescence
3. Laser Scanning Microscopy: Confocal, Spinning Disc and SPIM Imaging
4. Beyond Abbe Resolution: STED, STORM, SIM
5. The mathematical representation of images and their analysis
6. Image enhancement
7. Image segmentation and motion analysis
8. Doing image analysis with MATLAB

Assessment: A written report focusing on a particular imaging and analysis technique. It will include 
a practical part in which imaging data will be acquired and analysed with its outcomes also discussed 
in the report.

Network Biology (NB)
Dr Lorenz Wernisch, Dr John Reid (MRC Biostatistics Unit, Cambridge)
Networks are ubiquitous in biology: from gene regulatory networks to protein-protein interaction 
graphs, but also increasingly to represent knowledge (e.g. ontology graphs) and high-dimensional data 
(e.g. neuroimaging). Their ability to visually represent and seemingly simplify complex relationships 
makes them popular with researchers trying to make sense of complicated biological mechanisms or 
to find patterns in a tangle of interactions of thousands of components. However, inferring and 
constructing networks from data is challenging. We will discuss the basics of causal and network 
inference and also some cautionary tales about challenges and limitations of such methods. The visual 
appeal of networks, that they are able to represent relationships graphically, is somewhat diminished 
one their complexity surpasses a certain threshold and we need statistical and algorithmic tools and 
methods to extract patterns, structures, and meaning from them. We will look into graph analysis 
methods, for example methods exploiting the graph spectrum and recent attempts to apply deep 
learning concepts that reveal structures in graphs from the small to the large scale.

Assessment: There will be two assignments (with equal weight, one during and one towards the end 
of the series) involving mini projects of implementing, testing and applying some methods discussed in 
the lectures. A reasonable knowledge of R programming will be required for the projects.

Easter Term

Systems Biology (SB)
Johan Paulsson and Andreas Hilfinger (Harvard Systems Biology)
Kinetic design principles in cells, e.g feedback loops, multi-stability. Deterministic rate equations. 
bounds and trade-offs in control. Biological model systems, e.g. bacterial gene expression, plasmids. 
Single cell and single molecule experiments. Synthetic biology.

Assessment: One assignment that has an individual and group part
7. Internship

You will spend the last three and a half months of the course (May, June, July and August) working on a research project based in a company, other academic institution (such as the EBI or Sanger) or in another department of the University of Cambridge. The internship is a mandatory assessed component of the MPhil course and is weighted as three modules towards your final result (2.5 modules for the written report and 0.5 modules for the presentation). It is a very important part of the course as it provides students with the opportunity to undertake a piece of original research and to make contacts that may be useful when going on to do a PhD or to find work. Those who are looking for a job after the end of the course may find a company project particularly useful as this will provide you with a reference and relevant work experience.

We have found that it takes at least the first term for many students to know what field they wish to pursue. Lent term is therefore normally when students start looking for and discussing potential projects with supervisors. You can of course start earlier and we strongly recommend that students use the Wednesday seminars (see Section 4 – Calendar) as an opportunity to familiarise themselves with current research and to start exploring potential project topics. We will have a meeting towards the start of Lent Term to discuss internships. Some students from previous years will also attend the meeting and describe their own experiences of undertaking a project. You will be welcome to ask them questions and we hope that you will find this useful.

Projects advertised by the Department

The Department will advertise a list of potential projects on the Course Moodle. These will give you brief details of projects that have been submitted to us. You are encouraged to follow up projects that interest you directly with the named contact. Please remember that details of the company projects are often necessarily sketchy because they may involve commercially sensitive material. We hope to be able to start publishing opportunities from the start of Lent term and will add to the list as and when details are received from hosts/supervisors. You are advised to monitor the relevant page of Moodle for updates.

Arranging your own project

We encourage you to follow your own interests. If there is a particular area in which you wish to conduct research you should discuss it with potential supervisors directly. If you do decide that you want to arrange your own project, there is one proviso; you must discuss details of any self-directed project with the Course Director first and you must have his approval before going on to make any definite arrangements. We are happy for students to try to arrange a project which is in the same field as their future PhD and for this period to be, informally, the start of their doctoral study.

Please remember that when you are contacting a company or university that you are representing not only yourself but the course and the University of Cambridge. It is absolutely essential that any contact is made in a professional, polite and business-like manner. If you are unsure about the best way to contact a company or institution then please ask for advice before proceeding.

Confirmation of Internship Project

Whether you decide to take up a project advertised by the Department or to organise your own, you are required to confirm the details (title and supervisor/host details) to the Course Administrator no later than Friday 04 May 2018. Details of final projects will be posted on Moodle.
Written Report
The exact nature of this report will vary according to your internship. It should take the format of a dissertation, and as a guide should be structured as follows:

- Chapter 1 - introduction/aims/literature review
- Chapter 2 - your work (possibly broken down into more than one chapter).
- Chapter 3 - conclusions / future work
- References
- Appendices - for any extra material (e.g. code snippets, detailed derivations) that you wish to be included for future reference, rather than necessarily to be read by the examiner.

The report should be no more than 18,000 words, which means that your report should be no more than around 36 pages (at 500 words/page, but that assumes no figures). This word limit excludes the bibliography and appendix. Please note this is an upper word limit — writing a short clear report is much better than a long report padded with text to reach the upper word limit. Please write the word count on the front page of the report.

Declaration of Authorship
In the preface to your report you must include a declaration of authorship, signed and dated as follows:

I hereby declare that this dissertation entitled [Enter Your Project Title] is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text. I further state that no substantial part of this dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. I confirm that I have read and understood the Faculty of Mathematics Guidelines on Plagiarism, the University-wide Statement on Plagiarism, and the Faculty of Mathematics Student Information Document on the use of Turnitin text-matching software.

This declaration is not included in the word count.

Submission deadline
The deadline for submission of your Internship Report is no later than 4pm on Wednesday 8 August 2018. You must submit an electronic copy of your report to the Course Administrator by this date and time. Electronic submission is via Moodle (see Section 9).

Presentation
All students are required to give a presentation on their project research. Presentations will take place on Wednesday 15 August to Friday 17 August 2018 (TBC). A detailed timetable will be provided closer to the time. Given the number of presentations involved and the need to co-ordinate the timetable with the availability of the examiners, it is not possible for students to select their own time slots. Students are therefore advised to make sure that they are available all day on these dates until they are notified of the final arrangements. Students are welcome to attend each other’s presentations if they so wish and are encouraged to support each other in this way.

It is expected that students will give their presentation in person. If you are unable to attend in person, you should contact the Course Administrator at the earliest opportunity. Permission from the Course Director must be given for the presentation to be undertaken by skype or video conference. If this proves necessary, students must take responsibility for ensuring that appropriate arrangements are
made. No allowances or dispensations will be made. We strongly advise students to make every effort to make their presentation in person.

Each presentation is expected to last 20–25 minutes, with five minutes for questions. You will be expected to keep to time. If you are still talking at 25 minutes, you will be asked to stop immediately. A timer is usually available to help you keep aware of the time elapsed. We strongly advise that you arrange to give several practice talks (e.g. to your colleagues, or host lab). Experience has shown that people who practice give better talks.

For your presentation, you will be required to submit your electronic files (PPT/PDF/Keynote) by **Monday 13 August 2018**. Submission is via Moodle

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**8. Unfair means, plagiarism and collusion**

The University and Department take very seriously the use of unfair means, plagiarism and/or unauthorised collusion in work submitted for formal assessment. All students are expected to be familiar with and abide by the Faculty and University guidance on plagiarism. The Faculty’s guidance on plagiarism can be found online at [www.maths.cam.ac.uk/facultyboard/plagiarism/](http://www.maths.cam.ac.uk/facultyboard/plagiarism/). The University’s guidance on plagiarism, along with guidance on study skills and good academic practice is available at [http://www.admin.cam.ac.uk/univ/plagiarism/](http://www.admin.cam.ac.uk/univ/plagiarism/).

The Department uses Turnitin text-matching software to screen all MPhil work that is submitted for assessment, including the Internship Report. Students are required to complete an online declaration stating that they acknowledge the use of this software. Details will be circulated, together with a copy of the Faculty’s *Student Information Document* on the use of Turnitin at the start of term.
9. Assessment and Examination

Marking Scheme

We will use the following marking scales to evaluate your work on each module:

Grade A  75–100%  Excellent
Grade B  65–74%  Good
Grade C  60–64%  Satisfactory
Grade D  50–59%  Fail
Grade F  Under 50%  Fail

Your final mark will be based on your average score from all the modules you have taken (including the three modules which are awarded for the project). To pass the course, your average score must be 60% or over. Those scoring at least 75% will be awarded a distinction which must include a score of 60% or over in the examination.

Managing your workload

If you are feeling overloaded and cannot hand in your coursework on time then please do not panic. We would prefer you to hand in work that is incomplete rather than failing to meet the deadline. This may seem harsh but we have found that giving general extensions to deadlines can compound the feeling of being overloaded because other coursework deadlines then start to overlap. When a particular task proves difficult for many students we will take this into account when marking the work. If there is a general sense of being overloaded or other difficulties with coursework then please ask your Course Representative to speak to the Course Director. You may find that particular elements of the course are difficult. Please let us know if this is the case.

Late Submission and Extensions

The deadlines set for the submission of assessed work (including the internship report and presentation) should be treated as firm. Any work that is submitted after the specified deadline without clear mitigating circumstances will not be marked. You will be awarded zero for the piece of work in question.

Students may request a formal extension to deadlines on the basis of illness or serious personal grounds. To request an extension, students must obtain a supporting letter from their College Tutor. This letter should be addressed to the Course Director but sent to the Course Administrator, who will discuss the request with relevant parties and respond directly to the student with the outcome. The letter from the Tutor must clearly set out the grounds for the delay; confirm that supporting medical evidence has been received by the college (if appropriate), and propose a revised submission date. Whenever possible, this procedure must be carried out before the original submission date has passed.

Submission of assessed work to Moodle

Each piece of coursework must be submitted in the format specified by the lecturer setting the work. Presentation of your work is important and will be taken into account when marking your assignments. Please keep a reference copy of all work submitted for assessment until after the examinations process has been completed.

Unless otherwise stated, all coursework, including the internship report and presentation, must be submitted for marking via Moodle. You will be given access to the site at the start of the year and will be able to log-in using your raven password. Within the site there is a section entitled ‘Assignments’. Each assignment will have its own section where you will be able to upload your work. Assignment details are added throughout the course of the year as they are needed, so do not be concerned if you cannot see all the assignments straight away.
Please note that when you submit your work Moodle will automatically note the time of submission. You will not be able to upload work to the system after the specified deadline has passed. If you submit work before the deadline, you can resubmit work to the system (e.g. if you upload the wrong file or you want to amend a piece of work). If you experience any technical difficulties in using the site or cannot access it please contact the Course Administrator.

Unless explicitly requested otherwise, upload only one file, which should be a PDF. Please do not scan in handwritten notes and submit them as a PDF. They will not be accepted. In previous years, some users of Microsoft Word on Windows submitted PDFs that were not printable from Unix machines—this is normally a problem with the PDF not including the fonts that you were using on your machine. We strongly encourage the use of LaTeX, as this generates high-quality portable documents.

Before submitting each piece of work, please rename the file to include your CRSid and the abbreviated assignment name and number. For example, if user ‘xyz20’ was submitting Functional Genomics Assignment 1, his/her file would be called: xyz20_fga1.pdf.

Written Examination
There will be a two hour written examination at the end of the taught part of the course. You will be advised by the end of Lent term which modules will be examined. The exam will be held on Friday 11 May 2018. If appropriate, you are allowed a calculator in the exam room but it must be an approved University model. In 2014/15 the approved models are CASIO fx 991 (any version), CASIO fx 115 (any version) and CASIO fx 570 (any version). Before the examination you must have your calculator marked as approved by the Mathematics Undergraduate Office (B1.28). Only calculators marked as approved in advance will be permitted in the exam hall.

If you require exam access arrangements to be put in place, you should discuss the circumstances with your College Tutor well in advance of the examination. Further advice is available here: www.admin.cam.ac.uk/students/studentregistry/exams/before/special.html.

Oral examinations (viva voce)
The regulations for the MPhil in Computational Biology permit the examiners to call any candidate for the degree to an oral examination. Usually the Examiners will only request an oral examination where a candidate is at risk of failing the degree on the basis of his/her provisional marks. The provisional date for oral examinations in 2017-18 is Friday 17 August 2018. Students are expected to be available in Cambridge on this date and to attend an oral at short notice.

Provisional marks and feedback
No marks are confirmed until they have been formally approved by the Degree Committee at a meeting at the end of September. However, in order for students to know how they are progressing it has been agreed that individual assignment marks may be released as they are received. Marks will be released by the Course Administrator via Moodle. Students will not receive their overall module marks, internship report and presentation marks, or their final result until after the Degree Committee meeting in September. Students should note that provisional marks are subject to change and may be adjusted (either up or down) as part of the ongoing examinations process. They are provided as an indication of progress only. Any other form of feedback on assignments is provided at the discretion of the examiner or lecturer concerned.

Notification of degree and confirmation of final marks
At the beginning of September the Examiners will meet to agree the final marks for each candidate. The Examiners recommend to the Degree Committee the final marks, and whether or not each candidate has met the requirements of the degree for which they are being examined. The Degree
Committee will review the recommendations and will ultimately confirm the approval or non-approval of the degree in each case.

Following the Degree Committee meeting a statement of final confirmed marks, together with notification concerning the overall outcome of the examination will be sent individually to candidates by post. Whilst the Department seeks to notify students of the outcome at the earliest possible opportunity candidates should not expect to receive their results until mid-October following the end of their course.

To ensure prompt receipt of results, candidates should ensure that the mailing address in their CamSiS Self-Service account is updated. If you do not know where you will be based in October you are advised to give details of a family address which is not likely to change in order to avoid delay in receiving your final results.

**Graduation, Degree Certificates and Official University transcripts**

Colleges are responsible for organising graduation and the Department has no role to play – candidates should contact their College Tutorial Office to make the necessary arrangements. The Student Registry is responsible for the production of formal University transcripts and Degree Certificates. See [www.admin.cam.ac.uk/students/studentregistry/exams/after/degreeapproval.html](http://www.admin.cam.ac.uk/students/studentregistry/exams/after/degreeapproval.html) for further information.

**Continuation to the PhD**

It is not possible to provide formal confirmation of your degree result or marks prior to the Degree Committee meeting. If you have been made an offer to continue to undertake a PhD at Cambridge either in the Department or elsewhere your offer will, as a minimum, require evidence of completion of the MPhil degree. The Degree Committee will notify the Graduate Admissions Office of your completion immediately after the September meeting in order for this condition to be fulfilled. If you are required to pass with a particular overall mark, the Degree Committee will also provide this information as appropriate. Please do speak to the Course Administrator for further advice if you need to.

**Review of Examination results**

Examinations are covered by strict regulations and students **should not, under any circumstances, seek to discuss examination results with the Examiners**. The University has a standard procedure for the Review of Examination Results for Graduate Students, details of which can be found at [www.admin.cam.ac.uk/students/studentregistry/exams/after/review.html](http://www.admin.cam.ac.uk/students/studentregistry/exams/after/review.html). Students who are considering requesting a review under this procedure should discuss the matter with their College Tutor before proceeding. You should note that any investigation by the University will usually confine itself to seeing that the examiners acted correctly (for example that all the marks you received were entered into the mark book) and not try to second guess the examiners by re-marking your papers.
10. Resolving difficulties

Occasionally students may experience problems or difficulties during the course of the MPhil. Such difficulties can take very different forms. The guidance below is provided to help you to identify available support and advice should you encounter difficulties. Students are encouraged to raise any difficulties that they may have at the earliest opportunity. The sooner that we know about problems, the sooner they can be addressed.

Problems with particular modules
If you are experiencing difficulty with a particular module, you are encouraged to contact the relevant lecturer in the first instance. He or she may be able to provide you with additional literature or clarify material. You may also find it helps to talk to other students on the course. If there are issues with a module that cannot be resolved through discussion with lecturers you may wish to consult the Module Leader or Course Director (see Section 2 - Key Contacts).

Problems with the course in general
Sometimes a student may find that the course is not right for them. If you are at all concerned that this is the case you should consult the Course Director at the earliest opportunity. You may also wish to consult your College Tutor or Graduate Tutor at this time. It is important to note that you will become liable for payment of fees from day 21 of every term, even if you withdraw before the end of term.

Personal difficulties
Occasionally students encounter personal difficulties (eg. medical or financial) during the course of their studies. If you encounter personal difficulties that are not to do with the course itself, you should inform your College Tutor as soon as possible. S/He can advise you on your options and on any formal processes or procedures that may apply. Your College may also be able to provide you with other support (e.g. access to counselling services) and will have experience of dealing with many different issues. In addition, you should keep the Course Director informed.

Medical problems and disabilities
Students with medical problems or disabilities are strongly advised to discuss such problems with their College, who will offer advice and support for medical problems and disabilities. There is a University Disability Resource Centre (www.admin.cam.ac.uk/univ/disability/).

Equality and Diversity
The Mathematics Faculty is committed to creating and maintaining an environment for work, learning and research which is free from discrimination. It is expected that all members of the Mathematics Faculty (staff and students) will treat each other with respect irrespective of, for example, race, disability, religion, gender or sexual orientation. If you have concerns about any such matter, you are encouraged to approach, in confidence:

- either one of the Faculty Equality and Diversity contacts:
  - Orsola Rath-Spivack (room G0.09, email or100@cam.ac.uk);
  - Stephen Eglen (room G0.11, email sje30@cam.ac.uk);
- your College Tutor.

Informal advice
If at any stage you are uncertain of the best approach to dealing with problems, please do feel free to approach the Course Administrator, (compiomphil@maths.cam.ac.uk) or the Graduate Office Administrator, Sarah Dodd (grad-administrator@maths.cam.ac.uk) on an informal basis. Please do not hesitate to come and speak to us if you need to. The office is shared by a number of administrators, so if you would prefer to meet in a more private setting let us know and this can be arranged.
11. Guide for Internship Supervisors and Examiners

Potential supervisors are encouraged to contact the Course Administrator with details of potential projects. The nature of these projects can be quite diverse, as long as computational modelling/analysis of biological systems forms a central part of the project. Potential supervisors are encouraged to give a seminar to the students about their work.

We typically require no more than a 1/2 page description of the project and try to keep administration to a minimum.

We do however require several commitments from supervisors:

1. Supervisors are expected to provide the students with all the resources required to complete the project. (Students will however have access to a compute server based in the mathematics department.)

2. We recommend at least weekly meetings to ensure that the student is making suitable progress on the project.

3. Co-supervision of the project, e.g. with senior postdocs in a group, is allowed.

4. Internship project reports will be marked independently by two assessors: the project supervisor and an examiner. Each assessor will write a short (usually 1/2 to 1 page) report on the project, commenting where appropriate on the following elements:
   - Scientific approach to problem
   - Results
   - Overall quality of explanation
   - Style and presentation

   An overall grade should be provided according to the University-wide MPhil marking scheme:
   - 75% and over for a distinction
   - 65-74% for strong reports
   - 60-64% for satisfactory reports
   - A mark of under 60% therefore indicates a fail.

   If the discrepancy between two assessors’ marks is less than 10%, the two marks will be averaged. Otherwise, the two assessors will be asked to discuss the reports, and possibly adjust their marks. If no agreement can be reached, another assessor will be asked to adjudicate. Please note that reports will be made available to students after marking.

Assessment

Students will be assessed in two ways:

1. A written report of the project (worth 2.5 modules).
2. An oral presentation (worth 0.5 modules).
**Written report**

The exact nature of this report will vary according to the internship, but it should take the format of a dissertation, normally taking the following format:

- Chapter 1 - introduction/aims/literature review
- Chapter 2 - the work (possibly broken down into more than one chapter).
- Chapter 3 - conclusions / future work
- References
- Appendices - for any extra material (e.g. code snippets, detailed derivations) that can be included for future reference, rather than necessarily to be read by the examiner.

The report should be no more than 18,000 words; as a guide it should be no more than around 36 pages of text (at 500 words/page, but that assumes no figures). This word limit excludes the bibliography and appendix. Please note this is an *upper* word limit --- writing a short, clear report is better than a long report padded with text to reach the upper word limit. Please write the word count on the front page of the report.

Examples of reports from previous years are available from the Course Administrator.

**Oral presentation**

Presentation files (PPT/PDF/Keynote) are submitted to Moodle and uploaded to a group laptop that is used for all presentations; students are not normally permitted to use their own laptops for presentations. Each talk is expected to last 20-25 minutes, with five minutes for questions. Students are expected to keep to time, as there are many presentations in each day. If any students go over 25 minutes, they will be asked to stop immediately. We strongly advise that students arrange to give several practice talks (e.g. to colleagues, or host lab) as experience has shown that people who practice give better talks. Students are also encouraged to attend the talks of their colleagues.

**Key dates and contacts for 2017/18**

The key dates for students are:

- Project start: 14 May 2018
- Report submission: 8 August 2018, 16:00 BST
- Presentation submission: 13 August 2018, 16:00 BST
- Presentations: 15-17 August 2018 (TBC)

Project supervisors and examiners will receive reports for grading on 9th August; evaluations are required by 14th August 2018.

Please email the Course Administrator compbiomphil@maths.cam.ac.uk with any queries regarding internships.
12. Safety and Security

The CMS Safety Officer, Mick Young, will give a short safety briefing for students as part of the Introductory Meeting. It is your responsibility to act safely and avoid putting yourself or others at risk. All site occupants should follow safety instructions and inform the Safety Officer of anything causing concern about safety. If you are involved in an accident or observe a dangerous incident or safety risk, either in or outside the buildings or involving equipment, you should summon help. You should also report it, whether or not anyone was injured.

The CMS Site Safety Policy is available from http://www.cms.cam.ac.uk/safety/safetypolicy/. All students are expected to be familiar with this policy and abide by it. http://www.maths.cam.ac.uk/internal/admin

Accidents, incidents and hazards

All accidents, incidents and hazards must be reported to Reception, and a report form completed. If you need assistance outside normal office hours telephone University Central Security. They can be contacted on 31818 (non-emergency), or 101 (emergency) from any internally networked phone, or 01223 331818 from an outside line. The emergency number for FIRE, POLICE or AMBULANCE is 1999 from any University network telephone.

First Aid

In case of accident or illness, there are several First Aiders based on this site. To summon help from a First Aider telephone Reception on 65000. Contact details and First Aid boxes are also available in Common Rooms. If a First Aider is required outside normal office hours telephone University Central Security (numbers above).

Fire Safety

Familiarise yourself with entrances, emergency exits and fire-alarm assembly points. If the fire alarm sounds, leave the building by the nearest exit at that level if possible, avoiding stairs if you can and never try to use the lifts. Stay outside until the Fire Wardens allow you to re-enter. You may go into other buildings providing they are not also under alarm. Fire alarms are tested each Wednesday morning between 8.30-9.00am. The alarm will sound for only a few seconds and for this brief period can be ignored; if the alarm continues to sound please evacuate the building.

Access to CMS

The main doors into Central Core are normally unlocked on weekdays between 8.20am-5.30pm. On Saturdays when there are lectures the main doors are unlocked from 8.30am-1.00pm. Your University Card is needed for all other entrances, and also for most other internal doors including GL.04 in the evenings and at weekends. To have your card activated please take it to Reception. If you lose your card please report it to Reception.

Do not admit people without cards to the buildings. Close manual windows and lock manual doors if you are the last to leave.

Smoking policy

Smoking is not allowed in any of the CMS buildings and is actively discouraged near entrances or automatic vents and windows. Ashtrays are provided beneath the cycle shelters around the perimeter of the site and the circular seating areas outside the main entrance to Central Core.
13. Departmental information

Bicycles
There are cycle racks at several points around the CMS site - please use these. A good lock is a necessity. Please take care not to lock your cycle to neighbouring cycles. Cycles are not allowed inside the buildings or inside the courtyard between the Gatehouse and Pavilion A.

Cars
Unless you are registered disabled (and even then a place cannot be guaranteed) you will not be allocated parking.

Catering Facilities/Common Rooms
The central dining facility is open from 09:00 to 16:00 for snacks, light lunches and coffee/tea. Outside these hours there are coffee machines in the common room in each pavilion and vending machines in Pavilion A. Each pavilion has its own common room with fridge, microwave and coffee machine and milk and sugar are provided.

Disabled students
The building is suitable for disabled use but please contact Mick Young (66915) for advice on detailed access requirements.

Expenses
Jon Foulkes (Room B1.27) deals with all aspects of departmental finances including the administration of studentship awards. If you need to claim expenses then you are required to produce receipts for all items and to pass these and a completed departmental expense claim form to Jon.

Standard expenses (such as postage, phone, photocopying, fax, stationery etc.) are not normally charged for, but must be work-related. This policy is possible only if it is not abused, e.g. people do not make long national phone calls (note that phone calls are automatically logged). Please try to avoid making personal phone calls but if these are essential then contact Jon Foulkes and let him know how you would like to be billed.

Insurance
The University is not insured for theft or damage to your personal property while you are on University premises, so if you bring a computer with you then you should take out insurance for it. The University is insured for accidental personal injury to staff, students and visitors whilst they are on University premises but only where the accident was due to a fault on the University’s part.

Mail
Mail is placed in the pigeonholes, which are located by Reception. Your mail will be put in the MPhil-student pigeonhole. Outgoing mail should be placed in the trays in Reception before 15:00 on weekdays. A University Messenger Service (UMS) circulates between the University’s departments and Colleges. Internal mail is collected by the UMS daily and needs to be in the trays in Reception by 10:00 in order to be collected that day. There are no mail services at weekends. Please ask Reception if you have any queries.
Lockers
Lockers are located on the lower ground floor of G Pavilion, next to the MPhil Room (GL.03). These will be allocated on a first come first serve basis. Combination locks can be collected from the Graduate Office, C0.15.

Seminars
Lists of forthcoming seminars within DAMTP, DPMMS and the nearby Isaac Newton Institute for Mathematical Sciences are displayed on the large CMS screens and on the relevant web pages. See also www.talks.cam.ac.uk

Stationery
Please help yourself to stationery from the stationery store which is on the lower ground floor of Pavilion B. You will need a key for this and this can be obtained from either Reception or the Undergraduate Office (B1.28). If you need items which are not in stock please contact the Course Administrator.

Women in Maths
The women mathematicians at all levels, from Part III students to University Officers, meet in an informal group several times a year, usually at lunchtime. For support, advice or just a chat, contact Perla Sousi (ps422) or Carola Schoenlieb (cbs31). You may also want to look at the Faculty’s Women in Maths pages which link on to the Athena Swan pages: www.maths.cam.ac.uk/womeninmaths.html

14. Library

The Betty and Gordon Moore Library, located on the CMS site, is the main mathematical and physical sciences library of the University. Detailed information is available from www.lib.cam.ac.uk/BGML/. Please note that you must register when you first use the Moore.

Other libraries in Cambridge may be relevant to MPhil students. For example, the University Library in West Road holds a large collection of older mathematical material. A complete listing of Cambridge libraries may be found at http://www.lib.cam.ac.uk/libraries_directory/libraries_directory_n.cgi

The library catalogue is iDiscover http://idiscover.lib.cam.ac.uk Use this to search the University's libraries print and online collections using a single search.

Students may find online databases, such as maths publications via MathSciNet and preprints available at arxiv.org, useful. A Raven username and password may be needed to access certain online databases and journals, links to online versions of which may be found via the library website. In addition hard copies of some journals are available from the Betty and Gordon Moore Library or some of the other University and College libraries.
15. Email and Computing

Email and Computing Accounts
MPhil students will be issued with a University email account and a Desktop Services computing account by the University Information Services (UIS). Students who are new to Cambridge are able to retrieve passwords for these accounts in advance of arrival in Cambridge as part of the University’s Student Registration process. Students who have already studied at Cambridge should be able to access their previous account. Accounts that have been closed down during the summer vacation by UIS can be re-activated upon request. Further information about accounts is available from www.ucs.cam.ac.uk/accounts.

Mailing list
The Department operates a student mailing list for the MPhil. This list is used primarily for issuing important information to the MPhil student cohort. It is moderated to prevent students receiving unofficial email and/or junk email. Most students will have no need to send email to the list, and should do so only if information is of genuine academic interest to all students.

Laptops/Wifi Devices
You can connect to the Internet using Wifi on most of the site, including the roof and front grassy area. Further information is available at www.ucs.cam.ac.uk/wireless.

Windows/Linux PCs available for MPhil students at the CMS
PCs connected to the University’s Desktop Service are available for use by MPhil students in the Teaching Computer Room GL.04. The computers are all ‘dual-boot’ which means they can be started-up to run either Microsoft Windows or Linux. Many software applications are available on both Linux and Windows computers. You may use whichever operating system you prefer, but students who intend to stay on to do research may wish to learn Linux as most of the computers in DAMTP/DPMMS run Linux. Information on these facilities is available from www.maths.cam.ac.uk/computing/mcs/. Information on Desktop Services facilities in general, including a list of available software is available from www.ucs.cam.ac.uk/desktop-services/mcs

Printing
MPhil students are given some print-credit at the start of each academic year that can only be used to print to the two Desktop Service printers in GL.04. The amount of print-credit given is generous and should not require topping up during the year. Printing within the credit limit is free. If for any reason you run out of credit you can apply in writing for additional credit. A form and further details is available at www.maths.cam.ac.uk/computing/mcs/MCS-print.html.

Computing Help
Please email requests for computing assistance to: help@maths.cam.ac.uk

Computing Courses
The University offers a wide range of training courses. See the online training timetable and booking facility (training.cam.ac.uk/ucs/) for details.

Computing Rules
Users of the Part III computing facilities are subject to some rules which are published at https://www.uis.cam.ac.uk/about-us/governance/uis-policies-and-guidelines. In particular your attention is drawn to the following:

- Desktop Services accounts are issued for use by a single individual. You must not log in using another person's login name, or allow any other person to access facilities using your login name.
• Computer hardware should be used carefully and left in a condition fit for others to use.

• Information belonging to other users is confidential. You must not read, access, or modify any file not owned by you without the explicit permission of the owner. When a file is not protected (i.e. read or write access by others is allowed), it should not be assumed that permission to copy or modify the file is granted.

• Proprietary software must be used correctly in accordance with licensing conditions and must not be copied or modified. If you install any proprietary software, including shareware, on DAMTP computers, you must hold a valid licence.

• Users must not access any material on the Internet or other facility which:
  (a) is libellous, racist, obscene or indecent;
  (b) is likely or designed to cause offence, inconvenience or anxiety to others;
  (c) infringes copyright law or any other law (images and sound particularly);
  (d) is of a character likely to bring the University or Faculty of Mathematics into disrepute.

If you encounter such material by accident you are advised to stop viewing immediately and avoid accessing it again.