

Master's Programme in 
Scientific Computing

Course Handbook
2023-24

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MPhil Academic Committee

- The Course Director
- The Deputy Directors for the atomistic, continuum and HPC streams
- The Director of the CDT in Computational Methods for Materials Science
- The Examiners of the course
- The External Examiner of the course

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Introduction

The MPhil programme in Scientific Computing is offered by the University of Cambridge as a full-time course which aims to provide education of the highest quality at Master's level.

Covering topics of high-performance scientific computing and advanced numerical methods and techniques, it produces graduates with rigorous research and analytical skills, who are formidably well-equipped to proceed to doctoral research or directly into employment in industry, the professions and the public service.

It also provides training for the academic researchers and teachers of the future, encouraging the pursuit of research in computational methods for science and technology disciplines, thus being an important gateway for entering PhD programmes containing a substantial component of computational modelling.

The MPhil is administered by the Department of Physics, but it serves the training needs of the Schools of Physical Sciences and Technology. The ability to have a single Master's course for such a broad range of disciplines and applications is achieved by offering core (i.e. common for all students) numerical and High Performance Computing (HPC) lecture courses, and complementing them with additional courses relevant to atomistic and continuum modelling.

Course objectives

By the end of the course, students will have:

- a comprehensive understanding of numerical methods, and a thorough knowledge of the literature, applicable to atomic scale or continuum simulations;
- demonstrated skill in the application of knowledge, together with a practical understanding of how research and enquiry are used to create and interpret knowledge in their field;
- shown abilities in the critical evaluation of current research and research techniques and methodologies;
- demonstrated self-direction and skill in tackling and solving problems, and acted autonomously in the planning and implementation of research.

Transferrable Skills

The MPhil in Scientific Computing prides itself on providing a wide range of sought-after transferrable skills which graduates of the course will be able to apply in their future career, whether it is in academia or industry.

In particular:

- the written assignments provide training on **writing research papers** to a professional level, and on using **LaTeX** for document preparation;
- the mid-term research presentations offer training on **presenting research papers at a conference** and delivering **seminars**;
- the short 2-5 minutes viva poster presentations provide training on how to carry out **flash poster presentations** at conferences, also useful in industry for trade fairs;
- and ultimately, the wide range of **programming languages and techniques** offered throughout the course will give course graduates an edge when seeking employment, as these skills are in high demand in both industry and academia.

Course Architecture

MPhil in Scientific Computing	
Length:	12 months
Course structure:	<p>Taught courses - Michaelmas and Lent Terms</p> <p>Written assignments - Lent Term</p> <p>Research Project - Lent and Easter Terms</p>
Teaching methods:	Lectures, practicals, tutorials and supervision (for the research project).
Forms of assessment and weighting:	<p>Lent Term:</p> <p>Written Examinations (three) - 25% credit</p> <p>Written assignments (two) - 25% credit</p> <p>Easter Term:</p> <p>Project reports (two 7,500-word reports, submitted in May and August) - 50% credit (in combination with presentation and viva)</p> <p>Mid-term project presentation (June)</p> <p>Viva voce examination (August/September)</p>

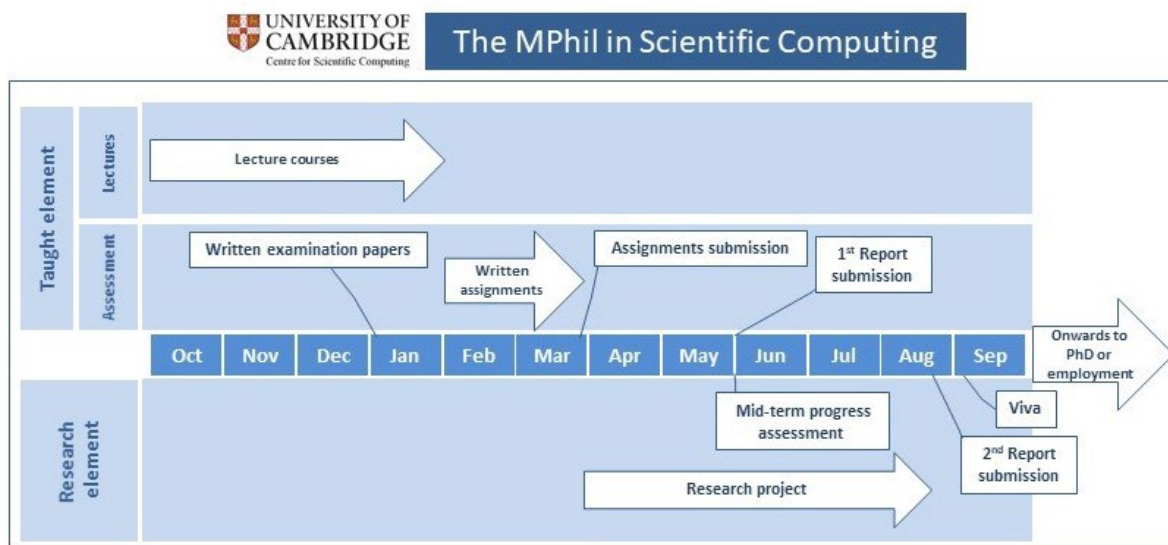
Overview

The MPhil in Scientific Computing is a 12-month full-time Master's Degree, which has a research and a taught element.

The taught element comprises lectures and practicals. It is examined by means of written assignments and written examinations and accounts for 50% of the total examination credit.

The research element is a project on a science or technology topic which is studied by means of scientific computation. To gain research examination credit (which accounts for 50% of the total examination credit), students have to submit two project reports, give a mid-term research presentation, give a recorded poster presentation, and attend a viva-voce examination.

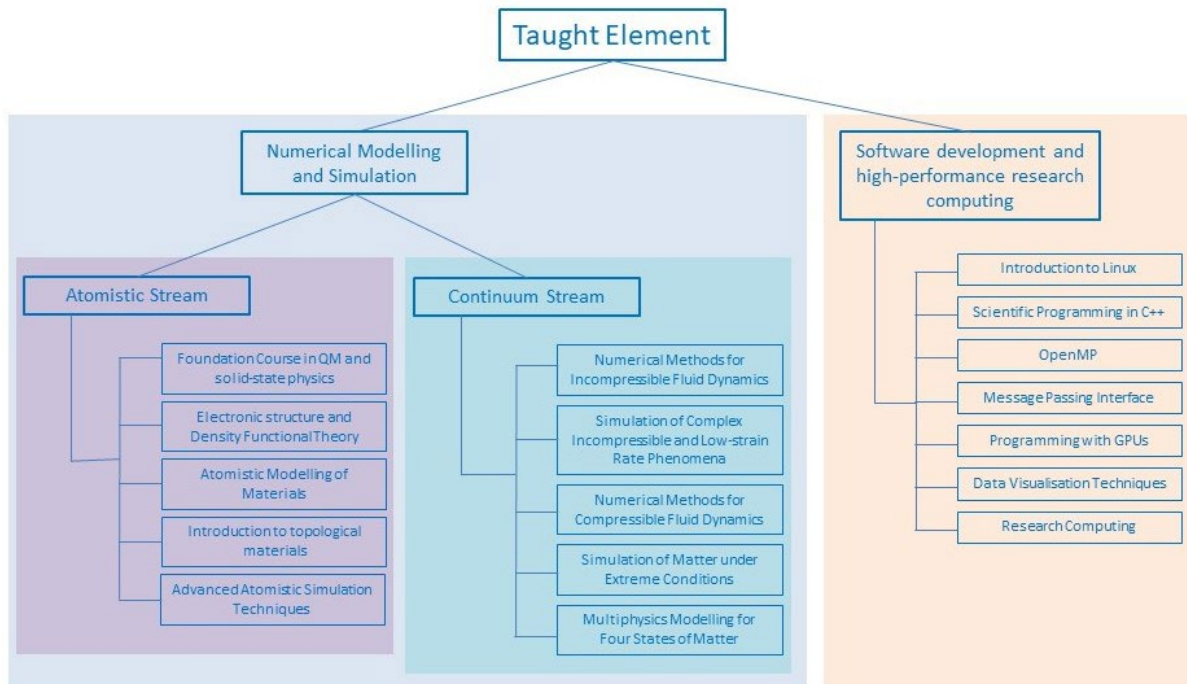
The students will attend lecture courses during Michaelmas and Lent Term, and complete written examinations and two written assignments between January and late March. They will then undertake a substantial Research Project over the next five months (from late March to mid- August). The research element aims to provide essential skills for continuation to a PhD programme or employment, as well as to assess and enhance the research capacity of the students. It is based on a science or technology topic which is studied by means of scientific computation. A range of research project topics will be provided during the academic year, which students will be asked to choose during Lent Term.



Taught Element



MPhil in Scientific Computing



The taught element comprises two main sets of lecture modules: one on theory, algorithms and methods for numerical modelling and simulation; and another on software development and high-performance research computing (HPC).

The lecture module set for numerical simulation has two further subsets (or streams), depending on the level that matter is described namely atomistic or continuum. For the complete list of lectures offered in 2023-24 please visit [this webpage](#).

The **continuum stream** focuses on the numerical simulation of four states of matter (gases, liquids, solids and plasma) at a continuum level (computational continuum physics), and their interaction (computational multiphysics).

The lecture modules for this stream are on the underlying theory of systems of nonlinear inhomogeneous partial differential equations, and on methods for their numerical solution. These include:

- **Numerical Methods for Compressible Fluid Dynamics**
- **Numerical Methods for Incompressible Fluid Dynamics**
- **Simulation of Complex Incompressible and Low-strain Rate Phenomena**
- **Multiphysics Modelling for Four States of Matter**
- **Simulation of Matter under Extreme Conditions**

The course offers foundation lectures in in continuum mechanics as a preparation for the continuum stream.

The **atomistic stream** of lecture modules is suitable for modelling and simulation at atomic scale, and the lectures are on electronic structure, density functional theory (DFT), molecular dynamics and Monte Carlo techniques. These include:

- **Atomistic Modelling of Materials**
- **Introduction to topological materials**

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- **Electronic structure and Density Functional Theory**
- **Advanced Atomistic Simulation Techniques**

The course offers foundation lectures in quantum mechanics and solid state physics as a preparation for the atomistic stream.

Typically, students will be examined on lectures belonging to one of the two streams, but they may attend as many lectures as their workload allows.

The lecture module set for **High Performance Computing** is attended by all students and offers training on:

- **Scientific Programming in C++**
- **Research Computing**
- **Advanced Research Computing**
- **Data Visualisation Techniques**
- **Message Passing Interface**
- **OpenMP**
- **Programming with GPUs**

These modules are aimed at developing skills which are highly transferable in all areas of research and employment. The lectures are complemented by hands-on practical sessions where the students write their own code and execute it on local laptops, CSC computer-servers, or the University's supercomputer.

Students are required to attend all HPC courses, as well as all modules related to their chosen stream. Please be aware that lectures offered each year may vary. The lecture timetable for 2023-24 can be found [here](#).

Students will be asked for their exam choices in November, and these will be subject to approval by the Course Director.

Assessment

Examination credit for the taught element is obtained by means of three written examination papers (25% of the overall credit) and two written assignments (25% of the overall credit).

The choice of modules a student takes for examination is based on their background and hence the stream (continuum or atomistic) they are going to follow. The lecture modules, the associated hands-on practical sessions and the written assignments provide a solid foundation for the research element.

The unseen written examination papers

The written examinations will take place in early January, and will take place in person at the West Cambridge Hub. These are in the form of two-hour, closed-book examinations.

Students will be expected to take three unseen written examination papers offered by the MPhil in Scientific Computing. These currently are:

Atomistic Stream

Paper 1 - Electronic structure

Paper 2 - Atomistic modelling of materials

Paper 3 - Introduction to topological materials

Paper 9 - Advanced Atomistic Simulation Techniques

Continuum Stream

Paper 4 - Numerical Methods for Compressible Fluid Dynamics

Paper 5 - Numerical Methods for Incompressible Fluid Dynamics

Paper 6 - Simulation of Matter under Extreme Conditions

Paper 7 - Simulation of Complex Incompressible and Low-strain Rate Phenomena

Paper 8 - Multiphysics Modelling for Four States of Matter

Mock exams will be offered at the end of each module for students to practise before the live exams in January.

The written assignments

The objective of the assignments is to provide the student with suitable background training on the underlying numerical methods and techniques which are necessary to complete the research project. A choice of assignments is offered based on the stream chosen and on the lectured topics. Students are required to choose four written assignments from the selection offered, ranked in order of preference. The Deputy Director for the relevant stream will then assign them two written assignments from their selection, based on supervisor availability.

The advisory word limit for each written assignment is within the range of **3,000 to 5,000 words**, including figure captions and references. Appropriate presentation of scientific results will be assessed as part of the overall quality of the report, therefore reports that are significantly outside the expected word limit may not be marked as highly.

Students are required to write the assignments in the LaTeX typesetting language using a research journal template (which will be provided by the course organisers), so as to resemble an article submitted for publication. This is part of their training for communicating their research in the scientific literature and in conference proceedings.

Each candidate is required to submit an electronic copy of their written assignments. The submission deadline for the two written assignments is in late March (see 'Important dates' on page 15) and candidates who fail to meet this deadline without advance permission from the Course Director will normally get no credit for this part of the assessment. Permission to defer submission will be granted only in exceptional cases, and candidates are asked to note in particular that computer-related problems will not normally be considered as grounds for deferral. Any application to defer submission must be made in writing to the Course Director in advance of the deadline and must be accompanied by a supporting letter from the candidate's College Tutor (please refer to the section 'Examination Allowances and Coursework Extension' for further information)

The written assignments are marked by suitable assessors, but the marks are subject to moderation by the Examiners of the course. The assessors' reports will be released to candidates.

In response to growing concerns over plagiarism in all University courses, each piece of submitted work must be accompanied by a standard cover sheet, including a signed declaration to the effect that the work is the student's own unaided effort and meets the University's guidelines and regulations on [plagiarism](#).

Students are required to provide the input files, analysis procedures, and plotting scripts used in generating the results presented in their written assignments. In cases where students have personally written source code for their projects, it is crucial to submit this along the other data. While it is common to utilize and adapt existing research software, it is essential to clearly indicate your contributions and changes. The

university's plagiarism regulations also extend to the submitted source code. Assessors may refer to the submitted code and scripts to evaluate your work.

The written assignments (and source-code) must be submitted with no personal identifying information, except for the student's Blind Grading Number. This is so that course staff can make use of TurnItIn and other plagiarism detection tools on the work. The University policy on TurnItIn can be found [here](#).

The Research Element

The research element is a project on a science or technology topic which is studied by means of numerical simulation. Many of the projects will be supervised by the course teaching staff, but members of the Departments of the Schools of Physical Sciences and Technology may also be involved.

Past project titles range from modelling a tokamak fusion reactor, to optimisation of beam shape in deep geo-thermal drilling, to understanding the salt dissolution process by machine learning, to modelling crystal structure.

This is a substantial piece of work, and has in the past offered the opportunity for students to publish their work in high-impact journals.

The research project is assessed by submitting two reports of at most 7,500 words each, the first in late May, the second in mid-August. Each report carries 25% of the total overall credit.

Following the submission of the first report, students will be asked to do a short 10-minute presentation on the progress of their project, which will be part of the evaluation for the marking for the first project report.

Following the submission of the second report, students will prepare a research poster, and will be asked to record a short video of between 3 and 5 minutes presenting their poster. They will then undergo a viva voce examination. These elements will all be part of the marking for the second project report.

Both report assessments will be carried out by two assessors, an external assessor from another institution and an internal assessor, who cannot be the student's supervisor or anyone closely associated with the supervision process.

The assessment of the projects is based on several factors, such as: the candidate's understanding of the background literature; the quality of the writing of the reports; the quality of the research, or if applicable, the degree of originality shown in the research; and the degree of rigour applied in justifying any conclusions.

Research Project Guidelines

A list of available projects will be provided towards the end of January/beginning of February. Students will be asked to rank the available projects in order of preference. Their preferences will be put forward to the relevant project supervisors, and projects will be assigned to students in mid-March.

Conduct of the research project

It is very important that the whole project is planned carefully and sufficient time allowed for each step of the research process, including writing up. During the course of their work, students are expected to see their supervisors regularly to receive feedback and advice on the design and implementation of their research projects and to receive critical comments on drafts of their project reports.

It is the responsibility of students to make and maintain contact with their supervisors, to attend supervisions as agreed, and to keep demands on their supervisors reasonable. Supervisors cannot be expected to do the students' work for them, or to respond instantly to requests for comments and advice. In
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particular, students should agree dates for the completion of near final drafts so that time can be set aside in advance for reading and commenting on these.

It is the responsibility of supervisors to monitor their students' work and ensure that it is progressing satisfactorily, to respond promptly to students' requests for meetings, and to turn work around in a timely manner. A good relationship between students and supervisor is crucial to the success of the MPhil course and students or supervisors are asked to contact the Director of the course as a matter of urgency if they experience any problems in this respect.

Format of the two project reports

The results of the research projects will be presented in two reports.

The contents of the two reports will be structured as follows:

Report 1: The project background, a literature review, the underlying mathematical models and the algorithms for their solution, as well as some validation of the computational results, and references.

Report 2: Validation/verification of the codes, results, post-processing and analysis of the results, and finally discussion, conclusions and references.

As per our Regulations in the Statutes & Ordinances, the two project reports should be of not more than 7,500 words in length each (including tables, figure legends, and appendices, but excluding bibliography).

Reports should be written in 12-point type, one and a half or double spaced and with margins of at least 2 cm. The project title page should bear, at the top of the page, the author's name, the approved title of the research project and the degree for which it is submitted. The supervisor's name should appear at the bottom right-hand corner of the page.

The reports must be submitted electronically. Candidates should take particular care to ensure that the correct version of the text appears in the documents submitted and that the title corresponds to that approved by the Degree Committee. Project reports must be connected accounts of an MPhil student's work, written by themselves.

The literature survey may be partly based on the written assignments, but it is expected that the majority of the content will deal with the research actually performed during the research period. Students are also permitted to cite content from their first report in their second report.

The form in which the reports are presented and the care with which they have been prepared and illustrated are in themselves evidence of the candidate's capabilities and will receive consideration as such. Apart from quotations (where appropriate) and recognised technical formulae, theses must be written in English and candidates are expected to show a reasonable command of the English language, to use a spellcheck facility, and to check their work carefully before submission. In submitting their reports, each candidate must state, generally in a preface and specifically in notes or in a bibliography, the sources from which their information is derived, the extent to which the candidate has availed themselves of the work of others, and the portions of the project which the student claims as their own original work. The following declaration of originality should appear on the page following the title page of each report:

"This project report is substantially my own work and conforms to the University of Cambridge's guidelines on plagiarism. Where reference has been made to other research this is acknowledged in the text and bibliography."

In response to concerns over plagiarism in all University courses, each piece of submitted work must be accompanied by a standard cover sheet, including a signed declaration to the effect that the work is the student's own unaided effort and meets the University's guidelines and regulations on plagiarism which are outlined on page 21.

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Submission of the project reports

The submission deadline for the First Report is at the end of May, while the Second Report is due in mid-August (for exact dates, see 'Important dates' on page 15) and any candidate who fails to meet these deadlines without advance permission from the Course Director will normally be awarded no marks for the research project and will fail the entire MPhil degree.

Candidates are required to submit a digital copy of each project report, together with a completed Certificate of Submission and anti-plagiarism declaration.

Students are required to provide the input files, analysis procedures, and plotting scripts used in generating the results presented in their reports. In cases where students have personally written source code for their projects, it is crucial to submit this along with the other data. While it is common to utilize and adapt existing research software, it is essential to clearly indicate your contributions and changes. The university's plagiarism regulations also extend to the submitted source code. Assessors may refer to the submitted code and scripts to evaluate your work.

Permissions to defer submission will be granted only in exceptional cases, please refer to the section 'Examination Allowances and Coursework Extension' on page 19.

Early submission

Students may be allowed to submit their Second Report and hold their viva early if needed, for instance those who are due to start a PhD in the US and need to leave the UK early. The early submission can be arranged for late July/early August, subject to agreement with the supervisor and the internal and external assessors.

Students wishing to request early submission need to let the Course Coordinator know by the end of March/beginning of April, and are advised to seek approval from their supervisor first.

Mid-term Research Presentation

Following submission of the First Report, students will have to give a presentation on the progress of their project, which will form part of the assessment.

Students are asked to hold a 10-minute presentation (followed by questions) on their work to a committee composed of the MPhil Academic Committee, project supervisors and other academics.

The Mid-term research presentation for 2023-24 will be held in early June (see 'Important dates', page 15).

Structure of the Mid-Term Research Presentation

Students will be required to provide an oral presentation of their research work to date, not exceeding 10 minutes. This time will be strictly adhered to, and students exceeding 10 minutes will be asked to stop. Afterwards, 5 minutes will be used for questions and a general discussion of the work with the audience.

The main aims of the mid-term presentation are:

- To communicate effectively on a chosen research topic
- To demonstrate the ability to defend a presentation in public
- To provide evidence of satisfactory progress with the Master's research project

Data projection facilities will be available. Students will be expected to submit PDF, Microsoft Powerpoint, or Apple Keynote presentations, with any animations or movies, before the Mid-Term Research Presentation. The files will be loaded onto a laptop provided by the course to facilitate smooth-running of the presentations.

Students will be presenting to an audience of academics and students.

The mid-term presentation represents a mandatory contribution to the overall research project requirements. Characteristics of a good presentation are:

- Clarity of delivery (organisation of material, engagement with audience, effective use of visual aids)
- Technical depth (relevance of material, critical awareness and grasp of the problem, nature of conclusions)
- Response to questions (factual probity, depth of reply, understanding of issues).

Poster presentation

After submitting their second report, the students have to prepare a poster as if they were to present their research to a conference, and record themselves giving a 3 to 5 minute presentation. This poster presentation will be part of the final evaluation for the second project report.

The video must be made available to the assessors the week before the viva voce examination. More details will be shared via email later in the academic year.

Viva Voce Examination

Viva voce examinations will take place in the last week of August, with exact dates depending on the availability of external and internal assessors.

The examination lasts for about 20 minutes, during which the student and two assessors discuss the project work in a closed session (no one else is admitted).

The purpose of a viva voce examination is to:

- Check that the project reports are the candidate's own work.
- Confirm that the candidate understands what they have written.
- Investigate the candidate's awareness of where their work sits in relation to the wider research field.
- Provide the candidate with an opportunity to justify their arguments and conclusions.
- Establish whether the research project is of sufficiently high standard to merit the award of the MPhil degree.

All viva voce examinations are different. The assessors will have read your project reports in detail, and can choose to ask you about any aspect of your written work, or the background science theory which relates directly to your project. However, various types of questions are quite common. For instance:

- The background science theory in your introduction. These questions may require depth or breadth of thinking about these topics, rather than a simple factual response.
- The methods or techniques you have used. The assessors may want to check that you have understood the technique properly, as a way of confirming that you actually did the work described in the project reports yourself. They may also want to check that you have understood any limitations of the techniques you have used, and any sources of error.
- Any quantitative analysis you have done. The assessors may want to check that you have understood the quantification procedure, rather than, for example, just pressing buttons on some software, with no understanding of what the software does to your data.
- Justify elements of your discussion and conclusion, or look at your data from an alternative viewpoint, and consider whether this alternative viewpoint impacts on the validity of your conclusions.

The assessors won't expect you to have an instant answer to every question they ask. It is fine to take some time to think about the question, or to ask for clarification. If you really have no idea how to answer a question, then you can tell the assessors this. They will usually be willing to give you some hints to help you

think about their question. Occasionally, the assessors may even misunderstand an element of your project reports, and if you think this has happened, so that the questions you are being asked appear to be addressing topics which are not relevant to your research project, you may wish to politely ask the assessors to explain the relevance of their questions.

The assessors are trying to give you an opportunity to demonstrate your knowledge, not to catch you out. If you have worked hard on your project and written it up carefully, the viva should be an enjoyable experience, since it gives you the opportunity to talk in detail about the work you have done, and perhaps discuss some new ideas arising from that work.

Project Reports Marking

In their project reports, presentations, and viva, the student should demonstrate the following:

1. An awareness of the basic background science underlying their project work and an awareness and critical understanding of the literature which is relevant to their project work, particularly where that literature may impact on their analysis of data or their conclusions.
2. An understanding of the computational techniques they have employed, including the limitations of those techniques and how these limitations might impact on their understanding or analysis of their data.
3. An ability to accurately describe, validate and interpret computational results.
4. An awareness of errors and ambiguities arising in computational techniques, and, where appropriate, an ability to quantify those errors.
5. An ability to draw convincing conclusions based on the evidence presented.
6. An ability to present their findings appropriately. This should include:
 - Providing a clear outline of the research problem and/or the goals of the research undertaken.
 - Writing a well-structured, concise report of appropriate length
 - Choosing appropriate illustrations and presenting them clearly with suitable annotations and legends.
 - Selecting references carefully, and presenting them in a consistent and appropriate form.

Additionally, the assessors are asked to assess to what extent the project work makes a fair contribution to the subject, and if it represents a useful contribution to learning. To pass the research project component of the MPhil course, the student should broadly meet criteria 1 - 6 described above. To achieve a "Distinction" the student should fully meet all criteria. Additionally, to achieve a high "Distinction", the research presented should represent a genuine and useful contribution to the field of study, and the dissertation as a whole should approach the quality expected of reports in reputable scientific journals.

Important Dates

Please be aware that this intensive one-year course does not follow conventional University terms, where there are times in which students are not expected to do coursework. MPhil SC students are expected to be actively attending the course and/or completing coursework throughout the year between October and the end of August.

If a student wishes to take significant time off, it is their own responsibility to ensure this does not interfere with their academic performance.

All lectures, events and deadlines are listed on the course **Google calendar**: <https://bit.ly/3BWIHJh>

Course dates	
Induction	2 October 2023
MT Lectures	5 October – 1 December 2023
Written examinations	8 – 12 January 2024
LT Lectures	15 January – 5 February 2024
Written assignments	5 February – 22 March 2024
Project	25 March – 16 August 2024
Mid-Term Research Presentation	3-7 June 2024
Poster presentation video	19-23 August 2024
Viva voce examination	26 – 30 August 2024
Final Examiners meeting	4 September 2024
Degree Committee meeting	13 September 2024

Submission deadlines	
Exam choices	6 November 2023
Written assignments	22 March 2024
First report	31 May 2024
Second report	16 August 2024

Examination Regulations

The Board of Examiners consists of the Academic Committee and the Course External Examiner. The Examiners will appoint assessors to help with the assessment of the written assignments and dissertations.

Published Examination Notice

Examination in Scientific Computing for the M.Phil. Degree, 2023–24

The Degree Committee for the Faculty of Physics and Chemistry give notice that the form of examination for the degree of Master of Philosophy in Scientific Computing in the year 2023-24 will be as follows:

<i>Type</i>	<i>Description</i>	<i>Credit</i>
Written examination	Min. of three papers, two-hour written examination	25%
Written assignments	Two written assignments, each 3,000-5,000 words	25%
Project reports	Two 7,500-word project reports, marked individually, each carrying equal weight (25 % each)	50%

Modules examined by means of written examination

These modules take place in Michaelmas Term 2023 and cover two research streams: atomistic (A) and continuum (C).

Candidates are required to attend all examinable modules related to their chosen stream, and should choose a minimum of three papers for examination; the written examination mark will be the average of the three highest marks attained.

These will each be examined by a two-hour written examination.

Paper 1 will consist of four questions, of which candidates will be required to answer all.

Papers 2-9 will consist of three questions, of which candidates will be required to answer two.

<i>Module</i>	<i>Paper no.</i>	<i>Stream</i>
Electronic structure	Paper 1	A
Atomistic modelling of materials	Paper 2	A
Introduction to topological materials	Paper 3	A
Numerical Methods for Compressible Fluid Dynamics	Paper 4	C
Numerical Methods for Incompressible Fluid Dynamics	Paper 5	C
Simulation of Matter under Extreme Conditions	Paper 6	C
Simulation of Complex Incompressible and Low-strain Rate Phenomena	Paper 7	C
Multiphysics Modelling for Four States of Matter	Paper 8	C
Advanced Atomistic Simulation Techniques	Paper 9	A

Paper 2 – Atomistic modelling of materials and Paper 9 – Advanced Atomistic Simulation Techniques will require the use of a University-approved calculator.

Modules examined by written assignments and project reports

The course offers a number of modules whose content is essential to the completion of the written assignments and research project. These are examinable by means of two written assignments, and two project reports.

Candidates should attend all the modules which are relevant to their research stream.

The modules offered may vary each year, and may be withdrawn if necessary due to unforeseeable circumstances and/or lack of resources.

The course may also introduce additional modules at a short notice, on topics which are relevant to the candidates' study requirements.

The modules examined by written assignments and project reports which the course plans to offer for this academic year will take place in Michaelmas and Lent Terms, and are as follows:

Foundation Course in QM and solid state physics (A)

Scientific Programming in C++ (A,C)

Advanced computational algorithms for PDEs (C)

Foundation course for the continuum modules (C)

Research Computing (A,C)

Programming with GPUs/CUDA (A,C)

Open MP (A,C)

Message Passing Interface (A,C)

Data visualisation techniques (A,C)

Adaptive Mesh Refinement (C)

Advanced Research Computing (A,C)

Marking

Weighting of the Assessed Course Components

Course Element	Weight
Project report 1:	25
Project report 2:	25
Written assignments on the core courses:	25
Written examinations on the elective courses:	25
Total:	100

Marking of the Course Components

Lecture courses and Research Project	
Distinction	≥ 75%
Pass	60% - 74%
Marginal fail	55%-59%
Fail	≤ 54 %

Marking Guidelines

The MPhil in Scientific Computing has an overall pass mark of 60%, while a Distinction mark is 75% and above. A mark of between 55 and 59 is considered a Marginal Fail, and a mark of 54 or less is considered a Fail.

Please note that marks are rounded down - for example, if a student's mark is 59.75 this will still be considered a Marginal Fail.

Students who fail or marginally fail one component but obtain an overall mark of 60% or above, will still be considered to have passed the course.

Marking guidelines for the project reports and the viva voce examination:

Fail: Work that is not of the standard that might be expected of an MPhil, either because of lack of useful contribution to learning or because it shows a poor grasp of the relevant literature or research method adopted, because the analysis is seriously flawed, because the argument is incoherent or because the standard of writing or presentation is unacceptably poor.

Marginal fail: Work that, while below the standard that might be expected at MPhil level, shows some evidence of independent thought and research, and a good basic command of the subject.

Pass: Work that shows evidence of independent thought and research, is of genuine interest as a contribution to its area of research, maintains a high standard of argument and scholarship throughout and demonstrates useful contribution to learning.

Distinction: Work of undoubted interest and which represents a useful contribution to learning, which combines the qualities noted above to an impressive degree. Work at the upper end of the range will be able to stand comparison against leading scholars in the field.

Examination results

The examination results for the MPhil are determined towards the end of September.

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An External Examiner, who is an expert in the field of scientific computing, is appointed at the start of the academic year to oversee the course. As part of their role, the External Examiner will review coursework, exam scripts and individual examiner reports in order to moderate the marks awarded and ensure consistency between the different marking styles across this multi-disciplinary course.

In the first or second week in September, the examiners of the MPhil in Scientific Computing and the External Examiner meet to discuss all the students' individual and overall marks – this is called the Final Examiners Meeting. At the end of this meeting, a provisional list of marks is reached.

These recommendations will then be considered by the Degree Committee of the Faculty of Physics and Chemistry which is the awarding body of the Degree. Once confirmed by the Degree Committee, the marks will be entered onto the online CamSIS system and will be used to produce the official Transcripts at the end of the course.

The whole procedure can take some time so it is likely that the final outcome of the examination process will not be formally confirmed before the end of September.

Candidates should note that arrangements for the receipt of degrees are the responsibility of the Colleges, and that only candidates whose Colleges are able to present them may graduate at any particular congregation. The College will require proof that you are to be awarded the Degree of MPhil. They will see the degree has been awarded on CamSIS and they will also receive a copy of the approval email sent to the candidate by the Degree Committee.

Please note that all students must be available in the Department, or contactable and available for a video call, on the day of the Final Examiners Meeting. This is in case the External Examiner may wish to call a student for a short viva voce exam to confirm the mark that will be awarded to the student, or if suspicions of plagiarism or use of Artificial Intelligence tools to complete coursework have been raised.

Examination Allowances and Coursework Extension

Written examinations

If a student, following illness or other unforeseen circumstance, feels that their performance in one or more of the written examinations may be negatively impacted by this, they may wish to contact their College Tutor to discuss mitigation processes.

Your tutor can submit the following on your behalf:

Exam Warnings: this is an early marker that will be kept with your student records to note something has happened and can be referenced later on if further support is needed, such as an exam allowance. Warnings can be submitted at any point throughout the assessment period and normally no later than the last day of your examination.

Exam Allowances: these can be applied for where your exams were affected by medical or grave cause. Applications for an allowance should be made as soon as possible, and no later than 3 months from publication of your examination results. Applications do not need to be submitted via your College, you can submit the request yourself with the support of your tutor, and you can apply directly by emailing admin@csc.cam.ac.uk However, Colleges have extensive experience in these types of applications so will be able to offer further advice and support, even beyond the allowance process.

Please include detailed explanations, as well as evidence if relevant, when submitting one of these requests.

Exam Warning and Exam Allowance letters must be submitted to the Course Director, via the Course's main email address admin@csc.cam.ac.uk within the timeframes specified above.

Exam Warnings and Allowances will be considered at the Final Examiners Meeting, and may influence decisions in the case of borderline overall marks; however, they will not change the individual exam's mark.

We are unable to offer exam re-sits; unfortunately, if a student is unable to take an exam, due to illness or other grave cause, they will not receive a mark for said exam. We do recommend that students who do not take an exam submit an Exam Warning and an Exam Allowance request detailing the cause of this, and including any evidence if relevant. All the documentation will then be discussed at the Final Examiners Meeting and also considered by the Degree Committee.

Coursework

Students who feel they are struggling to meet a coursework (written assignments or project reports) deadline, or have been negatively affected by a medical issue or other unforeseen circumstances, may request an extension to the submission deadline.

Extensions are granted on a case-by-case basis by the Course Director, up to a maximum of one week.

Extension requests must be submitted through your College Tutor to the Course's main email address admin@csc.cam.ac.uk and must include:

- Detailed reasons for the extension request
- Any evidence where relevant (for instance, if for medical reasons)
- The length of the extension requested
- For project reports we would also need a letter or email of support from your Supervisor.

Please note that computer-related problems will not normally be considered as grounds for deferral. Except in the case of genuinely unforeseeable emergencies, applications to defer submission will only be considered if they are received at least one week before the deadline.

Please be aware that each extension granted will affect the time available for the following coursework deadline.

We are unable to extend any coursework deadline beyond the week before the Final Examiners Meeting. Students who do not submit their final coursework by that date will be unable to graduate with their cohort.

Student Feedback Procedures

The MPhil Academic Committee values and very strongly encourages feedback from students on the performance of its academic and administrative staff and other aspects of the MPhil programme, to ensure the quality of their provision is maintained and increased from year to year and from module to module, with the objective of continuing quality improvement. The Course Coordinator will contact the students with feedback forms at various points during the year.

In addition to the formal mechanisms, informal feedback is welcome at any time and through any route (through student representatives, directly to the Coordinator of the course or to other staff members). Any serious or potentially serious problems should be communicated as quickly as possible so that action can be taken to correct them.

Course Liaison Committee

A course liaison committee will be established and meet before the end of the academic year, allowing sufficient time for the student group to get to know each other and provide feedback to two student representatives. The committee will consist of the following:

- The Course Director and Deputy Directors
- Two student representatives
- The Course Coordinator
- A representative from the previous cohort

Further resources for students

Please visit this page to access further resources, including the current Student's Code of Practice, Equality and Diversity information and Safety policies:

<https://www.csc.cam.ac.uk/academic/MPhilSciComp/resources>

Plagiarism

In response to growing concerns over plagiarism in all University courses, each piece of submitted work must be accompanied by a standard cover sheet, including a signed declaration to the effect that the work is the student's own unaided effort and meets the University's guidelines and regulations on plagiarism. These guidelines are outlined below.

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Regulations on plagiarism

Plagiarism is presenting the work of others as if it were one's own. If discovered by the Examiners, it will be treated as an attempt to gain credit under false pretences and may be referred to the University Court of Discipline. Plagiarism is treated by the University with the utmost seriousness, and severe penalties are imposed whenever it is detected. This may result in a candidate failing the degree, for which they are entered.

The Examiners will normally consider as plagiarism any instance in which the work/ideas of another person have been included in the submission of examinable work, whether or in paraphrase, without full acknowledgement to their author. This acknowledgement must include detailed bibliographic references (including Internet addresses where appropriate) to any sources from which information or ideas have been derived.

It is appreciated that candidates will often perform practical exercises together, and that they may wish to study in groups in order to learn from each other and to solve problems together. However, it is essential that any material finally submitted for marking is the work of the candidate making the submission, written in their own words, and presented in their own way, with proper acknowledgement of all sources from which information has been derived, and a clear indication of the extent to which use has been made of the work of others.

Each candidate who submits a project report, essay, dissertation or any other work for examination will be required to sign a declaration that the submission is their own work, unaided except as may be specified in the declaration, that all sources are fully acknowledged and referenced, and that the submission does not contain material that has already been used to any substantial extent for a comparable purpose. If two or more candidates submit work in collaboration, they will each be required to sign the declaration and will be held jointly responsible for adhering to it.

Any marks awarded will be conditional on the above requirements having been met. Coursework marks contribute significantly to your overall mark. Because this work is not carried under examination conditions the distinction between beneficial co-operation and deliberate cheating should be clear in everyone's mind.

The course team will be using TurnItIn plagiarism detection software (<https://www.plagiarism.admin.cam.ac.uk/investigating/turnitin/students>) and MOSS (Measure of Software Similarity) <https://theory.stanford.edu/~aiken/moss/> in order to detect possible plagiarism.

Co-operation and teamwork

It is perfectly acceptable to discuss continuously assessed work with other students or supervisors. Such discussions are beneficial and we wish to encourage them. It is right that effective use of such discussions can lead to higher marks, always provided that it is the student who has made the main contribution to the work submitted and understands all of it.

Cooperation can go too far, however, especially if one student is effectively carried by another. Thus, while it may well be beneficial for students to discuss a problem, it is unacceptable for two students to submit effectively identical essays or other assignment work. The named author must have made the main contribution to the work submitted and the report must be in their own words. Any attempt to pass off the work of others as being produced by the named author is cheating.

Web-based plagiarism

With the proliferation of easily accessible information on the internet there has been a steady rise in students using cut and paste techniques to import non-attributed material into their own work. Under no circumstances is this practice allowed and it is expressly forbidden. Sophisticated search engines are now available to staff to match passages suspected as having been plagiarised with the original source material. In circumstances where this confirms plagiarism from the internet the offending student will be immediately reported to the University authorities for disciplinary action.

The course team treats the issue of plagiarism very seriously. Integrity and responsibility in fulfilment of all course requirements is expected from all course participants.

Guidelines on plagiarism

In some cultures it may be seen as a form of flattery or respect to use someone else's words or ideas as part of the candidate's own material. However in many parts of the world, including the UK, words and ideas are considered to be intellectual property, owned by the individual who created them, in the same way they might own land or a lap-top computer. In these communities it is believed that a person's intellectual property must not be used without permission. Deliberate and conscious copying is unethical and against the high standards set by scientific researchers, academic authors and professional engineers.

In constructing a written piece of work it is therefore essential that the reader is clearly informed where the source material has been derived from, and identify any ideas or forms of expression that are not your own. This means all sources must be accurately cited so that the person owning the intellectual property is given proper acknowledgement for the work they have done. These are the high standards which are strictly adhered to at Cambridge University and even if you try and express someone else's ideas in your own words this too is considered plagiarism.

Citing a source

This means including a reference in your text to show that material such as words, data, ideas, diagrams, software, etc. has been extracted from another source. This can be done easily by including in parenthesis the author's last name and date of publication e.g. (Smith, 2002). This reference is cross-referenced to a complete list at the end of your paper or report in the form of a Bibliography, which directs the reader to the

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location of the material (book, Journal, web-site page etc.). This information must be complete and accurately presented so the reader can find the source for themselves. Not only does this approach properly acknowledge the work of others but it also allows the reader to judge how much you are relying on information from perhaps just one or two, as opposed to many, authors and how recent and up to date this information is.

In general, any specific information, which is not common knowledge, must be cited. If in any doubt whether a fact or other information is common knowledge then a source must be cited. Other people's ideas can be included in two ways: either by quoting the source directly within quotation marks, or by paraphrasing in your own words the idea. In both cases, the reference to the source material must be cited. However direct quotes should not be overused and it is best to only include them in your work if the author has made a point in a particularly insightful way. These quotations can complement, but cannot be a substitute for, your own line of reasoning.

It is possible to fall into the trap of unconscious plagiarism, usually arising from an over zealous direct use of notes when preparing written assignments and reports. It may also occur if an essay is based too closely on the highlighted passages of marked up texts or photocopies.

Including un-referenced material downloaded directly from the internet also constitutes plagiarism. Any web-based information should be respected and cited like any other more traditional source. Also there is far less quality control applied to much information which is posted on the internet and so the veracity of material obtained in this way should be treated with greater caution, doubt and uncertainty.

A piece of work, which merely cites the ideas and results of other authors' endeavours, is not transformed into "original" work simply by the use of extensive referencing and footnotes. It is vital that your work adds a critical dimension to this material through your own judgement and analysis.

If in any doubt make it clear to the reader by citation and references where the original idea, material or data has come from. If you don't, it will be considered as lying, cheating, stealing and an insult to the original author.

Note on Artificial Intelligence

We recognise that artificially intelligent chatbots, such as ChatGPT, are new tools being used across the world.

The University has strict guidelines on student conduct and academic integrity. These stress that students must be the authors of their own work. Content produced by AI platforms, such as ChatGPT, does not represent the student's own original work so would be considered a form of academic misconduct to be dealt with under the University's disciplinary procedures.

The University has issued guidance to Departments to help address concerns about risks to the integrity of assessments.

For up-to-date advice on plagiarism please see the University's website:

<https://www.plagiarism.admin.cam.ac.uk/>