



DEPARTMENT OF
**COMPUTER
SCIENCE**

UNDERGRADUATE COURSE HANDBOOK

PARTS A & B

For students entering the second year of their course in 2022/23

Computer Science
Computer Science & Philosophy
Mathematics & Computer Science

2022

Version 1.1

Welcome

This is a supplement to the [Computer Science Handbook](#). It is designed to give you all the course-specific information you will need in your second and third years, complete with all important deadlines.

Please don't hesitate to get in touch with one of the academic admin staff at academic.administrator@cs.ox.ac.uk if you have any questions.

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Disclaimer

This handbook supplement applies to students entering the second year of their degree in Computer Science, Mathematics & Computer Science or Computer Science & Philosophy in Michaelmas Term 2022. The information in this handbook may be different for students starting their second year in other years.

The Examination Regulations relating to this course will be available online at

[Honour School of Computer Science](#)

[Honour School of Mathematics and Computer Science](#)

[Honour School of Computer Science and Philosophy](#)

If there is a conflict between information in this handbook and the Examination Regulations then you must follow the Examination Regulations. If you have any concerns please contact the academic admin team at academic.administrator@cs.ox.ac.uk.

The information in this handbook is accurate as at October 2022. It may be necessary for changes to be made in certain circumstances, as explained at www.ox.ac.uk/coursechanges webpage. If such changes are made the department will publish a new version of this handbook, together with a list of the changes, and you will be informed.

| Version | Action | Date |
|-------------|--|--------------|
| Version 1.0 | Published start of MT22 | |
| Version 1.1 | Links and Recommended Patterns of Teaching updated | Week 0, MT22 |
| | | |
| | | |

1 Courses

Please find information on Course Aims and Intended Learning Outcomes for each degree in the [Undergraduate Course Handbook for the Preliminary Examinations](#).

For all undergraduate courses, you will have been entered initially for the 4-year degree, and will need to decide early in your third year whether you wish to carry on into the fourth year or leave at the end of the third year with a BA. Discuss this with your College Tutor, and inform your College's Academic Office.

To proceed into the fourth year (Part C), you will need to have an average of 2:1 or higher in Parts A and B together.

Please note that each third year course in Computer Science will require about 10 hours of study a week.

1.1 Computer Science

The Department of Computer Science offers the following degrees in Computer Science at undergraduate level:

- BA – Computer Science, 3-year
- MCompSci – Computer Science, 4-year

1.1.1 Second and third years

Synopses for all courses can be found at www.cs.ox.ac.uk/teaching/courses/.

Second-year Computer Science candidates will take four core courses and four optional courses from Schedules A1 and A2. You will also complete the [Group Design Practical](#).

The four core courses are:

- [Compilers](#)
- [Concurrent Programming](#)
- [Algorithms and Data Structures](#)
- [Models of Computation](#)

The list of courses in Schedules A1 and A2 can be found at www.cs.ox.ac.uk/teaching/bacompsci/PartA/. These eight courses will be examined at the end of your second year.

In the **third year** you must either:

- take a total of six optional courses from Schedules B1 and B2 (with no more than two from Schedule B2) and a project report (the third-year project counts as two courses)
- or take a total of eight optional courses from Schedules B1 and B2.

To find out more about the project, please read the information [here](#).

The list of courses in Schedules B1 and B2 can be found at <https://www.cs.ox.ac.uk/teaching/bacompsci/PartB/>. These courses will be examined at the end of your third year. You will not be able to offer an optional subject in Part B that you have already offered in Part A of the examination.

Please take any Trinity Term courses in your second year. They will be examined in your third year, with your options for Part B.

You may, with the approval from your tutor, wish to take an “approved” course not offered by the Department of Computer Science. Some undergraduate students are interested in taking courses offered by other departments, primarily the Department of Statistics or the Mathematical Institute, that are not on the usual schedule of courses for students in Computer Science. In this case, you must agree with your tutor any courses that you wish to take, and both you and your tutor should write to the [Academic Admin](#) team. The Academic Admin team will seek the relevant permission from the departments involved and the request will then formally be made to Undergraduate Supervisory Committee (UGSC). Once any request has been approved by UGSC, the student will be given instructions on completing exam entry for the course(s).

1.2 *Mathematics & Computer Science*

The Department of Computer Science offers the following joint degrees with the Department of Mathematics:

- BA – Mathematics and Computer Science, 3-year
- MMathCompSci – Mathematics and Computer Science, 4-year

1.2.1 *Second and Third years*

Second year Mathematics and Computer Science students take the following Maths papers:

- [A0 Linear Algebra](#)
- [A2 Metric Spaces and Complex Analysis](#)

In addition, you must offer either two papers from A3-A5, A7-A11 or one paper from A3-A5, A7-A11 and paper ASO.

- [A3 Rings and Modules](#)
- [A4 Integration](#)
- [A5 Topology](#)
- [A7 Numerical Analysis](#)
- [A8 Probability](#)
- [A9 Statistics](#)
- [A10 Fluids and Waves](#)
- [A11 Quantum Theory](#)
- [ASO Short Options](#)

You must also take the two core Computer Science courses:

- [Algorithms and Data Structures](#)
- [Models of Computation](#)

You will also take the [Group Design Practical](#)

In addition, you must offer two optional courses from Schedules A1(M&CS) and A2(M&CS). A list of courses on this schedules can be found here: <https://www.cs.ox.ac.uk/teaching/mcs/PartA/>

These courses will be examined at the end of the second year.

It is particularly important to choose courses in your second year that will lead on to the options that you wish to take in the third year, especially if you want to spend more than half of your time on Maths courses in the third year. You should consult your college tutor for advice about this.

Please take any Trinity Term courses in your second year. They will be examined in your third year, with your options for Part B.

In your **third year**, you must offer eight optional courses from Schedules B1(M&CS), B2(M&CS) subject to the conditions that:

- You must offer at least two courses from Schedule B1(M&CS).
- You must offer at least two courses from Schedule B2(M&CS).

You will not be able to offer an optional subject in Part B that you have already offered in Part A of the examination. You can find a list of the courses on Schedules B1(M&CS) and B2(M&CS) on the Computer Science website:
<https://www.cs.ox.ac.uk/teaching/mcs/PartB/>

Synopses for Computer Science courses can be found at
<https://www.cs.ox.ac.uk/teaching/courses/>.

Synopses for Mathematics courses can be found at
<https://courses.maths.ox.ac.uk/course/index.php?categoryid=104>.

1.3 *Computer Science and Philosophy*

The Department of Computer Science offers the following joint degrees with the Faculty of Philosophy:

- BA – Computer Science and Philosophy, 3-year
- MCompPhil – Computer Science and Philosophy, 4-year

1.3.1 *Second and Third Years*

For Parts A and B together you must take two Computer Science Part A core courses, plus an equivalent of 14 option "course-equivalents", with at least four from Computer Science, and at least six from Philosophy. The remaining four may be chosen from either discipline without restriction. Each Philosophy option is worth two "course-equivalents" and each Computer Science option is worth one. The possible combinations are:

- four Computer Science options and five Philosophy options;
- six Computer Science options and four Philosophy options;
- eight Computer Science options and three Philosophy options.

Computer Science

In the **second year** of the degree you are required to take the core Computer Science courses:

- [Algorithms and Data Structures](#)
- [Models of Computation](#)

You will also take the [Group Design Practical](#).

In addition, you must offer at least two and no more than four optional courses from Schedules A1(CS&P) and A2(CS&P). These courses will also be examined at the end of your second year. You can find a list of the courses on Schedules A1(CS&P) and A2(CS&P) on the Computer Science website: <https://www.cs.ox.ac.uk/teaching/csp/PartA/>

These core and optional courses will be examined at the end of your second year, in your Part A examination.

Please take any Trinity Term courses in your second year. They will be examined in your third year, with your options for Part B.

In your **third year**, for your Part B examination, you must choose between two and six Computer Science courses from Schedules, B1(CS&P) and, B2(CS&P), which you can find on the Computer Science website:

<https://www.cs.ox.ac.uk/teaching/csp/PartB/>

You will take three, four or five Philosophy courses, from [this list of courses](#).

You will also be able to offer a Philosophy thesis as specified in the [Regulations for Philosophy in all Honour Schools including Philosophy \(subject 199\)](#). You can only offer a thesis if you are doing three other Philosophy courses.

Please note that you cannot offer more than two courses from Schedule B2(CS&P) and that you must offer at least two Philosophy courses from 101, 102, 103, 104, 108, 122, 124, 125, and 127.

You can find details of Philosophy courses on the [Philosophy Faculty Website](#).

You will not be able to offer an optional subject in Part B that you have already offered in Part A of the examination.

2 Group Design Practical

The second year course also includes a group design practical as part of the practical requirements for the year. This will allow you to practise the skills you learnt in the core programming courses, and to begin to develop a range of further skills including team-working, project and time management, and presentation skills.

The group design practical is intended to take you 20-30 hours, mainly during Hilary term. There will be a briefing meeting early in Hilary term, setting out the aims and format of the exercise and listing several possible problems to tackle. You will then be allocated to a team of around 5 people to work on one particular problem together. Each team will be allocated a member of staff to act as a supervisor, and will have three meetings with their supervisor during the project.

The first meeting with the supervisor will take place at the beginning of Hilary term, where the group will present a specification and project plan.

The second meeting with the supervisor will take place in Hilary term: the group will present their initial module implementations and test results.

The third meeting will take place in Trinity term: the group will demonstrate their product and deliver a brief final report. Each student will also deliver to the supervisor a one-page summary of their individual contribution.

Finally, the groups will present their work to students, members of the Department, and guests, and prizes will be presented.

The final group report and summary of individual contribution will be assessed as S+, S, Pass or Fail. The group design practical counts as one-third of the total practical mark for the second year and candidates are required to achieve at least a Pass. Your supervisor will submit your group report and the summary of your individual contribution to the Examiners to be considered along with your other practical reports.

3 Examinations for Parts A and B

Exam Entry

You will be asked to complete exam entry for your chosen options in Hilary Term. Please only enter for examinations that you wish to take, and for which you will submit assessment. If you are unsure whether or not you wish to take a course, please discuss it with your tutor and the Academic Admin team.

Joint Schools: Please note that this is particularly important when entering for the Compilers Examination as an option. For this paper once you have entered for the examination you cannot withdraw from it nor change option from it.

Written Examinations

For courses which are examined by a written examination in Trinity Term, the examination will last for 2 hours. All papers will have three questions, and you may attempt two of them. In finals papers, questions are marked out of 25. The marks for each part of each question will be indicated on the examination paper.

Mini-projects

Where a course is examined by a mini-project, this will be released via Inspira on Friday of week 8 of the term in which the course is taught. The mini-project will be due at the start of the following term:

Michaelmas Term mini-projects

By noon on Tuesday of week -1, Hilary Term (on Inspira)

Hilary Term mini-projects

By noon on Monday of week -1, Trinity Term (on Inspira)

3.1 Computer Science

The examinations for Part A will be sat at the end of your second year:

[Concurrent Programming](#), [Algorithms and Data Structures](#) and [Models of Computation](#) will each be examined by a 2 hour written examination.

[Compilers](#) will be examined by an assessed practical (35% of the marks) and a 2 hour written examination (65%). Instructions for the assessed practical will be handed out on **Friday in week 8 of Michaelmas term**, and the practical report must be uploaded to Inspira by noon on **Friday of week 2 of Hilary term**. The assessed practical will incorporate and extend elements of the lab exercises that were set during term. As always, the work you submit must be your own, except where explicitly acknowledged.

[Appendix A](#) of the Course Handbook sets out the standards that are expected in this regard. Please see also the University's [guidelines for academic good practice](#).

The examinations for Part B will be sat at the end of your third year.

The [examination papers](#) will be two hours long with three questions, and you may attempt two of them. In finals papers, questions are marked out of 25. The marks for each part of each question will be indicated on the examination paper.

In the third year you can choose to submit a [project report](#).

3.2 Mathematics & Computer Science

The examinations for Part A will be sat at the end of your second year:

Second year Mathematics and Computer Science students take the following Maths papers:

[A0 Linear Algebra](#) (1.5 hours). This paper includes three questions and you should answer two; each question is marked out of 25.

[A2 Metric Spaces and Complex Analysis](#) (3 hours). This paper includes six questions and you should answer four. The best four questions count towards a candidate's total mark for the paper.

In addition, candidates must offer either two papers from papers A3-A5, A7-A11, ASO.

You must take two core Computer Science courses: [Algorithms and Data Structures](#) and [Models of Computation](#). You will also take two optional Computer Science courses.

The examinations for Part B will be sat at the end of your third year

In your third year, for Computer Science, you must offer eight optional courses from Schedules B1(M&CS), B2(M&CS) subject to the conditions that:

- You must offer at least two courses from Schedule B1(M&CS).
- You must offer at least two courses from Schedule B2(M&CS).

For Computer Science Part B at the end of your third year, the [examination papers](#) will be two hours long with three questions, and you may attempt two of them. The Compilers course will be examined by assessed practical and written paper as for Computer Science (see above).

3.3 Computer Science and Philosophy

The examinations for Part A for Computer Science will be sat at the end of your second year:

Second year Computer Science and Philosophy students are examined on the two Computer Science Part A core courses ([Algorithms and Data Structures](#) and [Models of Computation](#)) and at least two, but not more than four optional courses at the end of their second year.

The examinations for Part B in both Computer Science and Philosophy will be sat at the end of your third year.

You have to take an equivalent of 14 option "course-equivalents", with at least four from Computer Science, and at least six from Philosophy, [as outlined above](#).

Your Computer Science options will be examined in your Part B examination at the end of your third year. The [examination papers](#) will be 2-hours long and will contain three questions, and you may attempt two of them. In finals papers, questions are marked out of 25. The marks for each part of each question will be indicated on the examination paper. The Compilers course will be examined by assessed practical and written paper as for Computer Science (see above).

Your [Philosophy options](#) will also be examined in your Part B examination. Full details of the requirements for the examinations for Philosophy can be found in the Examination Regulations [here](#).

4 Important Dates

4.1 Dates of term 2022-2023:

Michaelmas term: Sunday 9th October 2022 – Saturday 3rd December 2022

Hilary term: Sunday 15th January 2023 – Saturday 11th March 2023

Trinity term: Sunday 23rd April 2023 – Saturday 17th June 2023

Dates of Full Term for future years are available [on the University's website](#).

4.2 Hand-In Dates – Practicals and Project Reports

Practicals reports

By noon on Friday of week 5, Trinity term (to Inspira)

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2nd Year Compilers Practical Assignment

By noon on Friday of week 2, Hilary term (to Inspira)

2nd Year Group Design Practical

Final Report – By Friday of week 2, Trinity term – you can find more information [on the Department's website](#).

Presentation – Week 3, Trinity term – day to be confirmed.

3rd Year Computer Science Project Report

By noon on Monday of week 4, Trinity term (to Inspira).

5 Recommended Patterns of Teaching

Please compare the [list of courses on the Departmental Website](#). If in doubt, please refer to the website.

5.1 Computer Science

| Paper | Term | Faculty | | College | | Comments |
|--|-------|----------|--|-----------|---------|----------------------------------|
| | | Lectures | Classes | Tutorials | Classes | |
| Core courses | | | | | | |
| Models of Computation | MT | 16 | | 4 | | |
| Compilers | MT | 16 | | 4 | | This course also has practicals. |
| Concurrent Programming | HT | 16 | | 4 | | This course also has practicals. |
| Algorithms and Data Structures | HT | 16 | | 4 | | |
| Group Design Practical | HT/TT | 7 | 6-7 one-hour seminars on software engineering/testing/working in teams and version control | | | |
| Students are required to take 10-12 optional courses over the course of the second and third years. The recommendation is that they take four of these in the second year. | | | | | | |
| Parts A and B | | | | | | |
| Computer Aided-Formal Verification | MT | 16 | 4 | | | |
| Computer Security | MT | 16 | 4 | | | |
| Geometric Modelling | MT | 16 | 4 | | | This course also has practicals. |
| Databases | MT | 16 | 4 | | | This course also has practicals. |
| Machine Learning | MT | 20 | 4 | | | This course also has practicals. |
| Principles of Programming Languages | MT | 16 | 4 | | | This course also has practicals |
| Artificial Intelligence | HT | 16 | 4 | | | This course also has practicals. |
| Computational Complexity | HT | 16 | 6 | | | |
| Computer Architecture | HT | 16 | 4 | | | This course also has practicals. |
| Computer Graphics | HT | 16 | 4 | | | This course also has practicals. |
| Knowledge Representation & Reasoning | HT | 16 | 4 | | | |
| Lambda Calculus and Types | HT | 16 | 4 | | | |

| | | | | | | |
|----------------------------|----|----|---|---|--|----------------------------------|
| Logic and Proof | HT | 16 | 4 | | | |
| Quantum Information | HT | 16 | 4 | | | |
| A8 Probability | MT | 16 | | 4 | | |
| Part B only | | | | | | |
| Combinatorial Optimisation | MT | 16 | | | | |
| Data Visualisation | HT | 16 | 6 | | | |
| Concurrency | TT | 16 | 4 | | | This course also has practicals. |
| B8.4 Information Theory | MT | 16 | | | | |
| B6.3 Integer Programming | MT | 16 | | | | |
| B1.2 Set Theory | MT | 16 | | | | |

Notes:

- Second year core courses are accompanied by tutorials organised by colleges; the norm is 4 45-minute tutorials.
- Classes will be organised centrally for the computer science optional courses, although colleges may alternatively organise tutorials.
- The Group Design Practical, which is part of the practical requirements for the year, is intended to take 20-30 hours, mainly during Hilary term (with some work in Trinity term).
- Students can either undertake a Computer Science Project in the 3rd year which is expected to take about a quarter of the year, or take 2 additional options courses from Schedule B1.

5.2 Mathematics and Computer Science

| Paper | Term | Faculty | | College | | Comments |
|---|-------|----------|---|-----------|---------|-----------------------------|
| | | Lectures | Classes | Tutorials | Classes | |
| Core Computer Science courses | | | | | | |
| Models of Computation | MT | 16 | | 4 | | |
| Algorithms and Data Structures | HT | 16 | | 4 | | |
| Group Design Practical | HT/TT | 7 | 6-7 one-hour seminars on software engineering/ testing/working in teams and version control | | | |
| Core Mathematics courses | | | | | | |
| A0 Linear Algebra | MT | 16 | | 4 | | |
| A2 Metric Spaces and Complex Analysis | MT | 32 | | 8 | | |
| Mathematics options A | | | | | | |
| Either two papers from papers A3-A5, A7-A11 or one paper from A3-A5, A7-A11 and paper ASO | | | | | | |
| Computer Science options | | | | | | |
| Part A only | | | | | | |
| Compilers | MT | 16 | | 4 | | This course has practicals |
| Concurrent Programming | HT | 16 | | 4 | | This course has practicals. |
| Parts A and B | | | | | | |
| Computer Aided-Formal Verification | MT | 16 | 4 | | | |
| Computer Security | MT | 16 | 4 | | | |
| Databases | MT | 16 | 4 | | | This course has practicals. |
| Geometric Modelling | MT | 16 | 4 | | | This course has practicals. |
| Machine Learning | MT | 20 | 4 | | | This course has practicals. |
| Principles of Programming Languages | MT | 16 | 4 | | | This course has practicals. |
| Artificial Intelligence | HT | 16 | 4 | | | This course has practicals. |
| Computational Complexity | HT | 16 | 4 | | | |
| Computer Architecture | HT | 16 | 4 | | | This course has practicals. |
| Computer Graphics | HT | 16 | 4 | | | This course has practicals. |
| Knowledge Representation & Reasoning | HT | 16 | 4 | | | |
| Lambda Calculus and Types | HT | 16 | 4 | | | |

| | | | | | | |
|------------------------------|-------|----|---|--|--|-----------------------------|
| Logic and Proof | HT | 16 | 4 | | | |
| Quantum Information | HT | 16 | 4 | | | |
| Part B only | | | | | | |
| Combinatorial Optimisation | MT | 16 | | | | |
| Data Visualisation | HT | 16 | 6 | | | |
| Concurrency | TT | 16 | 4 | | | This course has practicals. |
| Mathematics Options B | | | | | | |
| B1.1 – B8.5 | MT/HT | 16 | 6 | | | |

Notes:

- Second year core courses are accompanied by tutorials organised by colleges; the norm is 4 45-minute tutorials.
- Classes will be organised centrally for the computer science optional courses, although colleges may alternatively organise tutorials.
- The Group Design Practical, which is part of the practical requirements for the year, is intended to take 20-30 hours, mainly during Hilary term (with some work in Trinity term).

5.3 Computer Science and Philosophy

| Paper | Term | Faculty | | College | | Comments |
|---|-------|----------|--|-----------|---------|----------------------------------|
| | | Lectures | Classes | Tutorials | Classes | |
| Core courses | | | | | | |
| Models of Computation | MT | 16 | | 4 | | |
| Algorithms and Data Structures | HT | 16 | | 4 | | |
| Group Design Practical | HT/TT | 7 | 6-7 one-hour seminars on software engineering/testing/working in teams and version control | | | |
| Students are required to take 10 optional courses over the course of the second and third years. The recommendation is that they take four of these in the second year. | | | | | | |
| Computer Science options | | | | | | |
| Part A only | | | | | | |
| Mathematics for Computer Science and Philosophy | MT/HT | 17/18 | | | 4 | |
| Compilers | MT | 16 | | | | This course also has practicals |
| Concurrent Programming | HT | 16 | | | | This course also has practicals |
| Parts A and B | | | | | | |
| Computer Aided-Formal Verification | MT | 16 | 4 | | | |
| Computer Security | MT | 16 | 4 | | | |
| Databases | MT | 16 | 4 | | | This course also has practicals. |
| Geometric Modelling | MT | 16 | 4 | | | This course also has practicals. |
| Principles of Programming Languages | MT | 16 | 4 | | | This course also has practicals |
| Artificial Intelligence | HT | 16 | 4 | | | This course also has practicals. |
| Computational Complexity | HT | 16 | 4 | | | |
| Computer Architecture | HT | 16 | 4 | | | This course also has practicals. |
| Computer Graphics | HT | 16 | 4 | | | This course also has practicals. |
| Knowledge Representation & Reasoning | HT | 16 | 4 | | | |
| Lambda Calculus and Types | HT | 16 | 4 | | | |
| Logic and Proof | HT | 16 | 4 | | | |
| Quantum Information | HT | 16 | 4 | | | |
| A8 Probability | MT | 16 | | 4 | | |

| | | | | | | |
|--|----|----|---|--|--|----------------------------------|
| Part B only | | | | | | |
| Combinatorial Optimisation | MT | 16 | | | | |
| Machine Learning | MT | 20 | 4 | | | This course also has practicals. |
| Data Visualisation | HT | 16 | 6 | | | |
| Concurrency | TT | 16 | 4 | | | This course also has practicals. |
| B8.4 Information Theory | MT | 16 | | | | |
| B6.3 Integer Programming | MT | 16 | | | | |
| B1.2 Set Theory | HT | 16 | | | | |
| Philosophy Options from subjects 101-116, 120, 122, 124, 125, 127-129, 137-139, 198, 199 | | | | | | |

Notes:

- Second year core courses are accompanied by tutorials organised by colleges; the norm is 4 45-minute tutorials.
- Classes will be organised centrally for the computer science optional courses, although colleges may alternatively organise tutorials.
- The Group Design Practical, which is part of the practical requirements for the year, is intended to take 20-30 hours, mainly during Hilary term (with some work in Trinity term).