DEPARTMENT OF
COMPUTER SCIENCE

UNDERGRADUATE COURSE HANDBOOK

PRELIMINARY EXAMINATIONS

For students starting in 2020/21

Computer Science
Computer Science & Philosophy
Mathematics & Computer Science

2020

Version 1.0

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 first year, 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 starting an undergraduate degree in Computer Science, Mathematics & Computer Science or Computer Science & Philosophy in Michaelmas Term 2020. The information in this handbook may be different for students starting in other years.

The Examination Regulations relating to this course are available at

Preliminary Examination in Computer Science

Preliminary Examination in Mathematics and Computer Science

Preliminary Examination in Computer Science and Philosophy

If there is a conflict between information in this handbook and the Examination Regulations then you should 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 2020. 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 MT20	13/10/2020

1 Courses

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

You will initially be entered for the 4-year degree, and will need to decide by 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.

Course Aims

- To provide a course of the highest academic quality in Computer Science in a challenging and supportive learning environment that attracts the very best students from the UK and elsewhere.

- To provide students with a broad, balanced knowledge of core areas and advanced topics in Computer Science, as defined by the QAA Benchmark Statement issued in 2019.

- To develop in students the ability to evaluate primary evidence critically and the conceptual understanding to marshal and present arguments and solutions based on primary data, relevant theory and the application of sound reasoning.

- To develop transferable skills relating to problem solving and spoken and written communication.

- To bring students to a position on graduation where they can choose confidently from a wide range of careers, both within the Information Technology sector and outside it.

Intended Learning Outcomes

Students will develop a knowledge and understanding of:

- the general theoretical and practical principles of Computer Science.
- a broad range of topics in theoretical Computer Science and the architecture and implementation of information systems.
- relevant mathematical theories and techniques and their application to practical design problems.
- methods of software development.

The course is in line with the criteria set out in the QAA benchmark statement for Computing, 2019. That benchmark statement recognizes the need for diversity of

provision in Computing, and the Oxford course remains firmly established at the theoretical end of the spectrum of degree courses. Topics from the body of knowledge outlined in the benchmark statement are covered as follows in the course:

1.1.1 First year

In the first year of the Computer Science degree, you will take ten lecture courses - nine taught in the Department of Computer Science and one taught in conjunction with Mathematics (with lectures organised by the Mathematical Institute). You will also attend the course Ethics and Responsible Innovation.

Computer Science

- Functional Programming
- Design & Analysis of Algorithms
- Imperative Programming Parts 1 and 2
- Imperative Programming Part 3
- Discrete Mathematics
- Linear Algebra
- Digital Systems
- Continuous Mathematics
- Introduction to Formal Proof

Mathematics

- Probability

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

You will initially be entered for the 4-year degree, and will need to decide by 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.

Course Aims

- To provide a course of the highest academic quality in Mathematics and Computer Science in a challenging and supportive learning environment that attracts the very best students from the UK and elsewhere.

- To provide students with a broad, balanced knowledge of the two subjects of Mathematics and Computer Science, as defined by the relevant QAA Benchmark Statements.

- To develop in students the ability to evaluate primary evidence critically, and the conceptual understanding to marshal and present arguments and solutions based on primary data, relevant theory and the application of sound reasoning.

- To develop transferable skills relating to problem solving and spoken and written communication.

- To bring students to a position on graduation where they can choose confidently from a wide range of careers, both within the Information Technology sector and outside it.

Intended Learning Outcomes

Students will develop a knowledge and understanding of:

- core areas of Mathematics, including the principal areas of Mathematics needed in applications;

- the general theoretical and practical principles of Computer Science;

- the basic ideas of mathematical modelling, particularly as applied to design problems in Computer Science;

- a broad range of topics in theoretical Computer Science and the architecture and implementation of information systems;

- the basic ideas of a variety of areas of specialisation in Pure and Applied Mathematics and in Computer Science.

The course combines elements from the programmes in Mathematical Sciences and in Computer Science, each of which is in line with the criteria set out in the respective QAA benchmark statements.

1.2.1 First year

In the first year of the Mathematics & Computer Science degree, you will take 11 lecture courses; five in Computer Science and six taught in conjunction with Mathematics (with lectures organised by the Mathematical Institute). You will also attend the course Ethics and Responsible Innovation.

Computer Science

- Functional Programming
- Design & Analysis of Algorithms
- Imperative Programming Parts 1 and 2
- Imperative Programming Part 3
- Continuous Mathematics

Mathematics

- Introduction to University Mathematics
- Introduction to Complex Numbers
- Linear Algebra I and Linear Algebra II
- Analysis I – Sequences and Series; Analysis II – Continuity and Differentiability and Analysis III - Integration
- Probability
- Groups and Group Actions

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

You are initially entered for the 4-year degree, and need to decide by 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.

Course Aims

- To provide a course of the highest academic quality in Computer Science and Philosophy in a challenging and supportive learning environment that attracts the very best students from the UK and elsewhere.

- To provide students with a broad, balanced knowledge of core areas and advanced topics in Computer Science, as defined by the QAA Benchmark Statement, including logic as a natural bridge with Philosophy.

- To enable students to appreciate the interest and importance of philosophical questions on a variety of topics, including links with Computer Science, and to contribute to the discussions of these questions.

- To enhance the understanding of both Computer Science and Philosophy by parallel study of these related disciplines with particular emphasis on the interdisciplinary subjects of logic and philosophy of science.

- To develop in students the ability to evaluate primary evidence critically and the conceptual understanding to marshal and present arguments and solutions based on primary data, relevant theory and the application of sound reasoning.

- To provide a learning environment which draws on the wide-ranging talents and expertise of staff in both Computer Science and Philosophy, and challenges and encourages students, with their differing needs, interests and aspirations, to reach the full potential, personally and academically.

- To develop transferable skills relating to problem solving, as well as promoting the ability to think independently, to develop powers of critical analysis, of sustained argumentation and of clear and effective communication both orally and in writing.

- To bring students to a position on graduation where they can choose confidently from a wide range of careers, both within the Information Technology sector and outside it.

And for students taking the 4-year MCompPhil

- To provide the foundations for graduate study at a leading university, in the UK or abroad, in either Computer Science or Philosophy.

Intended Learning Outcomes

Students will develop a knowledge and understanding of:

- the general theoretical and practical principles of Computer Science;
- a broad range of topics in theoretical Computer Science and the architecture and implementation of information systems;
- relevant mathematical theories and techniques and their application to practical design problems;
- methods of software development;
- selected philosophical texts and central philosophical issues and the concepts needed to discuss those texts and issues in and effective manner;
- the elements of mathematical logic and philosophy of science.

1.3.1 First year

In the first year of the Computer Science and Philosophy degree you will take ten courses - five in Computer Science, four taught in Philosophy and one taught in conjunction with Mathematics (with lectures organised by the Mathematical Institute). You will also attend the course Ethics and Responsible Innovation.

Computer Science

- Functional Programming
- Discrete Mathematics
- Design & Analysis of Algorithms
- Imperative Programming Parts 1 and 2
- Imperative Programming Part 3

Philosophy

- General Philosophy
- Introduction to Logic
- Elements of Deductive Logic
- Turing on Computability and Intelligence

Mathematics

- Probability

2 The Preliminary Examinations

[In the academic year 2020-21 the Department of Computer Science is planning to conduct Preliminary and Part A examinations in-person. If COVID-19 restrictions change during the course of the year they may be moved online.]

In Preliminary Examination papers for Computer Science and Mathematics, each question is marked out of 20. Each question will contain some parts of a straightforward nature, and some parts requiring more advanced understanding or an unseen application of techniques or theory from the syllabus. The examination paper will show the marks available for each part.

Please read the Examination Conventions and Notices to Candidates carefully.

2.1 Computer Science

In the Preliminary Examinations for Computer Science you will take the following **four** papers:

A10097W1 Functional Programming and Design and Analysis of Algorithms
A10098W1 Imperative Programming
A10100W1 Discrete Mathematics, Continuous Mathematics and Probability
A10101W1 Digital Systems, Linear Algebra and Introduction to Formal Proof

A10097W1 Functional Programming and Design and Analysis of Algorithms is of 3 hours' duration and contains eight questions (four on each constituent course); candidates should answer no more than five questions, with no more than three questions from either half of the paper.

A10098W1 Imperative Programming is of 3 hours' duration and contains eight questions (two on Part 1, three on each of Parts 2 and 3); candidates should answer no more than five questions, with no more than two questions from any part of the paper.

A10100W1 Discrete Mathematics, Probability, and Continuous Mathematics is of 3 hours' duration and contains nine questions (three on each constituent course); candidates should answer no more than five questions with no more than two from each section.

A10101W1 Digital Systems, Linear Algebra and Introduction to Formal Proof is of 3 hours' duration and contains eight questions (three on Digital Systems, three on Linear Algebra and two on Introduction to Formal Proof); candidates should answer no more than five questions with no more than two from each section.

Please see also the course description above and the Examination Regulations here.

2.2 Mathematics & Computer Science

Mathematics & Computer Science candidates take **five** papers; **Functional Programming and Design and Analysis of Algorithms**, and **Imperative Programming**, as described above, and also

A10138W1 Mathematics I
A10139W1 Mathematics II
A10149W1 Continuous Mathematics and Probability

A10138W1 Mathematics I is of 2.5 hours' duration and contains seven questions (four on Part A and three on Part B); you should submit answers to no more than five questions. You should submit answers to no more than three questions from Section A and no more than two questions from Section B.

A10139W1 Mathematics II is of 2.5 hours' duration and contains seven questions (three on Part A, three on Part B and one on Part C); you should submit answers to no more than five questions. You should submit answers to no more than two questions from Section A and to no more than two questions from Section B.

A10149W1 Continuous Mathematics and Probability is of 2.5 hours' duration and contain six questions (3 on each constituent course); candidates should answer no more than four questions.

Please also see the course description above and the Examination Regulations here.

2.3 Computer Science and Philosophy

Computer Science and Philosophy candidates take five papers; **Functional Programming and Design and Analysis of Algorithms** and **Imperative Programming** as described above, and also:

A10102W1 Discrete Mathematics and Probability
A10103W1 Introduction to Philosophy
A10134W1 Elements of Deductive Logic

A10102W1 Discrete Mathematics and Probability is of 2.5 hours' duration and contains six questions (3 on each constituent course); candidates should answer no more than four questions.

A10103W1 Introduction to Philosophy is of 3 hours' duration and contains twelve questions (six on Part A and six on Part B); candidates should answer four questions, including at least one from each section.

A10134W1 Elements of Deductive Logic is of 3 hours' duration and contain typically seven or eight questions; candidates should answer four questions. If you answer more than four questions, your overall mark will be determined by your four best answers.

Please also see the course description above and the Examination Regulations here.

3 Important Dates

3.1 Dates of term 2020-21:

Michaelmas term:	Sunday 11th October 2020 – Saturday 5th December 2020
Hilary term:	Sunday 17th January 2021 – Saturday 13th March 2021
Trinity term:	Sunday 25th April 2021 – Saturday 19th June 2021

Dates of Full Term for future years are available on the University's website.

3.2 Hand-In Dates – Practicals Reports

Practicals reports, including for the Ethics course:
By noon on Friday of week 5, Trinity term

4 Recommended Pattern of Teaching

Please compare the list of courses on the Departmental Website. If in doubt, please refer to the website.

4.1 Computer Science

Paper	Term	Faculty		College		Comments
		Lectures	Classes	Tutorials	Classes	
Introduction to University-Level Mathematics	MT	8		2		Taught by the Maths Institute: wks 1 and 2 only
Discrete Mathematics (CS3)	MT	16		4		
Functional Programming (CS1)	MT	16		4		This course also has practicals.
Linear Algebra (CS4)	MT	20		4		
Continuous Mathematics (CS3)	HT	16		4		
Probability (CS3)	MT	16		4		Taught by the Maths Institute.
Design & Analysis of Algorithms (CS1)	HT	16		4		This course also has practicals.
Digital Systems (CS4)	HT	16		4		
	TT	8		2		
Imperative Programming 1&2 (CS2)	HT	20		4		This course also has practicals.
Imperative Programming 3 (CS2)	TT	12		4		
Introduction to Formal Proof (CS4)	TT	10		2		
Ethics and Responsible Innovation	MT/HT	4	2			

Notes:

- All first year courses are accompanied by tutorials organised by colleges: the norm is 4 45-minute tutorials.
- Practical sessions Functional Programming will take place in person, with three sessions starting in Weeks 2 or 3. Online sessions are also available for those studying remotely.
- Practicals for other courses will be online consultation sessions.
- There will usually be a number of exercises that you will need to complete for each course. For example, a course with two practical exercises might have a practical timetable as follows:
  - Weeks 2, 4 Classes for first practical exercise
  - Weeks 6, 8 Classes for second practical exercise

4.2 Mathematics and Computer Science

Paper	Term	Faculty		College		Comments
		Lectures	Classes	Tutorials	Classes	
Introduction to University-Level Mathematics	MT	8		2		Taught by the Maths Institute: wks 1 and 2 only
Introduction to Complex Numbers	MT	2		0		Taught by the Maths Institute: week 1 only
Functional Programming	MT	16		4		This course also has practicals.
Linear Algebra	MT	14		4		Taught by the Maths Institute.
	HT	8		2		
Continuous Mathematics	HT	16		4		
Probability	MT	16		4		Taught by the Maths Institute.
Design & Analysis of Algorithms	HT	16		4		This course also has practicals.
Analysis	MT	15		4		Taught by the Maths Institute.
	HT	16		4		
	TT	8		2		
Imperative Programming Parts 1 and 2	HT	20		4		This course also has practicals.
Imperative Programming Part 3	TT	12		4		
Ethics and Responsible Innovation	MT/HT	4	2			
Groups and Group Action	HT	8		2		Taught by the Maths Institute.
	TT	8		2		

Notes:

- All first year courses are accompanied by tutorials organised by colleges: the norm is 4 45-minute tutorials.
- Practical sessions Functional Programming will take place in person, with three sessions starting in Weeks 2 or 3. Online sessions are also available for those studying remotely.
- Practicals for other courses will be online consultation sessions.
- There will usually be a number of exercises that you will need to complete for each course. For example, a course with two practical exercises might have a practical timetable as follows:
    - Weeks 2, 4 Classes for first practical exercise
    - Weeks 6, 8 Classes for second practical exercise

4.1 Computer Science and Philosophy

Paper	Term	Faculty		College		Comments
		Lectures	Classes	Tutorials	Classes	
Discrete Mathematics (CS3)	MT	16		4		
Functional Programming (CS1)	MT	16		4		This course also has practicals
Design & Analysis of Algorithms (CS1)	HT	16		4		
Imperative Programming 1&2 (CS2)	HT	20		4		This course also has practicals
Imperative Programming 3 (CS2)	TT	12		4		
Ethics and Responsible Innovation	MT/HT	4	2			
General Philosophy	MT	8				
Introduction to Logic	MT	8				
Elements of Deductive Logic	HT	8				
Turing on Computability and Intelligence	TT	8				
Probability	MT	16				Taught by the Mathematical Institute

Notes:

- All first year courses are accompanied by tutorials organised by colleges: the norm is 4 45-minute tutorials.
- Practical sessions Functional Programming will take place in person, with three sessions starting in Weeks 2 or 3. Online sessions are also available for those studying remotely.
- Practicals for other courses will be online consultation sessions.
- There will usually be a number of exercises that you will need to complete for each course. For example, a course with two practical exercises might have a practical timetable as follows:
  - Weeks 2, 4 Classes for first practical exercise
  - Weeks 6, 8 Classes for second practical exercise