Exam Briefing 2019

Or Everything you need to know about the exams other than the questions
Introduction

• Who am I?
Tim Griffin : Head 1A Examiner (among many other things)

• Why are we here?
To try and make the whole process a bit less scary

• Who are you?
  • 117 Computer Science 75% Papers 1&2&3
  • 5 Computer Science 50% with NST Papers 1&2
  • 8 Computer Science 50% with Maths Papers 1&2
  • 50 NST Paper 1 only
Practical Matters – When?  

CST ONLY!

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Venue 1</th>
<th>Venue 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday 30 May</td>
<td>09.00-12.00</td>
<td>MAT0/1 Mathematics Paper 1</td>
<td>Mill Lane Lecture-rooms</td>
</tr>
<tr>
<td>Friday 31 May</td>
<td>13.30-16.30</td>
<td>MAT0/2 Mathematics Paper 2</td>
<td>Mill Lane Lecture-rooms</td>
</tr>
<tr>
<td>Monday 03 Jun</td>
<td>13.30-16.30</td>
<td>1 Computer science Paper 1</td>
<td>Corn Exchange</td>
</tr>
<tr>
<td>Tuesday 04 Jun</td>
<td>13.30-16.30</td>
<td>2 Computer science Paper 2</td>
<td>Corn Exchange</td>
</tr>
<tr>
<td>Thursday 06 Jun</td>
<td>13.30-16.30</td>
<td>3 Computer Science Paper 3</td>
<td>Sports Hall, Cambridge Sports Centre</td>
</tr>
<tr>
<td>Saturday 08 Jun</td>
<td>13.30-16.30</td>
<td>PSIC/1 Physics Paper</td>
<td>Sports Hall, Cambridge Sports Centre</td>
</tr>
<tr>
<td>Monday 10 Jun</td>
<td>09.00-12.00</td>
<td>MATH/1 Mathematics Paper 1</td>
<td>Sports Centre Studio, Cambridge Sports Centre</td>
</tr>
<tr>
<td>Monday 10 Jun</td>
<td>13.30-16.30</td>
<td>CHEM/1 Chemistry Paper</td>
<td>Sports Hall, Cambridge Sports Centre</td>
</tr>
<tr>
<td>Wednesday 12 Jun</td>
<td>09.00-12.00</td>
<td>MATH/2 Mathematics Paper 2</td>
<td>Sports Centre Studio, Cambridge Sports Centre</td>
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</tbody>
</table>

Note that this timetable is for CST only, venues may be different for others.

This should have been sent to you on your examination confirmation form (yellow card)
It’s at:  
www.cambridgestudents.cam.ac.uk/your-course/examinations/all-students-timetable
Practical Matters – Where?

• Where? Papers 1, 2 and 3 = Corn Exchange
Practical Matters – Where?

- Where? Most other papers – Sports Centre
Practical Matters – Things to take with you

• Id
• Your candidate number
• Clothes

11. Candidates shall be dressed decently and not in a manner that is likely to create a disturbance in the examination room, or to distract the attention of other candidates.
• Pens, pencils
Practical Matters – Things NOT to take with you

• Mobile phone  -  £50 fine!

• Food
  4. A candidate may take a small screw-top bottle of water to his or her desk for consumption during an examination session provided that no disturbance is thereby caused to other candidates. Except with the written consent of the Secretary of the Board of Examinations no other items of food or drink may be taken into an examination room. A Supervisor, Invigilator, or Examiner has authority to deprive a candidate of unauthorized items until the examination session is ended.

• Books or papers

• Any means of data storage or retrieval

• Any radio or audio equipment
Practical Matters - Calculators

- You are allowed to take an approved calculator into
  - Computer Science papers 1, 2 & 3
  - All NatSci papers except NST Maths

- You are **NOT** allowed to take a calculator into
  - Any NatSci Maths papers
  - Any papers borrowed from the Mathematical Tripos

- Approved calculators must be marked by the Department (go to Student Administration)
- Only the following will be approved: Casio fx 991, fx 115, fx 570 (any versions)
### Part IA: Structure of Papers 1 and 2 in 2019

#### Paper 1

<table>
<thead>
<tr>
<th>Section A</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Attempt 1 question</em></td>
</tr>
<tr>
<td>1. Foundations of Computer Science</td>
</tr>
<tr>
<td>2. Foundations of Computer Science</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Section B</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Attempt 1 question</em></td>
</tr>
<tr>
<td>3. Object-Oriented Programming</td>
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<tr>
<td>4. Object-Oriented Programming</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Section C</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Attempt 1 question</em></td>
</tr>
<tr>
<td>5. Numerical Analysis</td>
</tr>
<tr>
<td>6. Numerical Analysis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section D</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Attempt 2 questions</em></td>
</tr>
<tr>
<td>7. Algorithms</td>
</tr>
<tr>
<td>8. Algorithms</td>
</tr>
<tr>
<td>9. Algorithms</td>
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<tr>
<td>10. Algorithms</td>
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#### Paper 2

<table>
<thead>
<tr>
<th>Section A</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Attempt 1 question</em></td>
</tr>
<tr>
<td>1. Digital Electronics</td>
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<tr>
<td>2. Digital Electronics</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Section B</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Attempt 1 question</em></td>
</tr>
<tr>
<td>3. Operating Systems</td>
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<tr>
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<table>
<thead>
<tr>
<th>Section C</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Attempt 1 question</em></td>
</tr>
<tr>
<td>5. Software and Security Engineering</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Section D</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Attempt 2 questions</em></td>
</tr>
<tr>
<td>7. Discrete Mathematics</td>
</tr>
<tr>
<td>8. Discrete Mathematics</td>
</tr>
<tr>
<td>9. Discrete Mathematics</td>
</tr>
<tr>
<td>10. Discrete Mathematics</td>
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</tbody>
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*Attempt five questions on each paper.*
UNIVERSITY OF CAMBRIDGE
DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

Part Ia (75%), Part Ib (50%): Structure of Paper 3 in 2019

Paper 3

Section A
Attempt 1 question
1. Databases
2. Databases

Section B
Attempt 1 question
3. Introduction to Graphics
4. Introduction to Graphics

Section C
Attempt 1 question
5. Interaction Design
6. Interaction Design

Section D
Attempt 2 questions
7. Machine Learning and Real-world Data
8. Machine Learning and Real-world Data
9. Machine Learning and Real-world Data

Attempt five questions on the paper.
I am asked this question every year, hence this slide.

All questions submitted are marked, but only 5 marks per paper will count.

Which 5 are entirely at the discretion of the examiners.

The marks chosen will obey the sectioning rules (ie 1 from Section A, etc), and will not necessarily be the highest marks.

It is the opinion of the examiners that you are better off spending any extra time you feel you might have by attempting to improve your 5 answers than by starting and submitting an extra question.
Practical Matters – Who’s who?

- Supervisor
- Invigilators & Assistants
- Examiners – only present for 1st 30mins, but you can ask questions after that.
- Proctor (rare)
- (not in the room) Assessors
Practical Matters – what happens when

• Aim to be outside 30-15 mins early. You may be admitted before the advertised time. (You will be allowed in up to 30 mins late)

• You will only see the exam cover. An invigilator will tell you when you can open the exam paper and start.

• You should read the whole paper before you start writing.

• Allow roughly 36mins per question (180 ÷ 5)

• There will be a 5 minute warning before the end of the exam

• You must stop writing when instructed at the end of the exam.

• You may then fill in the cover sheet (if you haven’t already).

• You may leave once your paper is collected. (You may leave earlier but not in the first 30 mins)
On your desk will be:

- The exam paper
- A stock of writing paper
- A stock of clearly marked rough working paper (probably!)
- A card with your name and examination number, and the number of your desk
- Some cover sheets
- Some tags
COMPUTER SCIENCE TRIPOS  Part IA
NATURAL SCIENCES TRIPOS  Part IA (Paper CS/1)
POLITICS, PSYCHOLOGY, AND SOCIOLOGY TRIPOS  Part I (Paper 9)

Monday 4 June 2012  1.30 to 4.30

COMPUTER SCIENCE  Paper 1

Answer five questions.
At least one question from each section is to be answered.

Submit the answers in five separate bundles, each with its own cover sheet. On each cover sheet, write the numbers of all attempted questions, and circle the number of the question attached.

You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator

STATIONERY REQUIREMENTS
Script paper
Blue cover sheets
Tags

SPECIAL REQUIREMENTS
Approved calculator permitted
Practical Matters – Cover sheet

**Cover Sheet**

- **Candidate Number**: 1234X
- **Desk Number**: 100
- **Examination (e.g. Tripos and Part)**: COMPUTER SCIENCE IA
- **Subject / Paper Number and Title**: PAPER 1
- **Section (where applicable)**: A
- **Questions Attempted**: 03579

**During the examination**
- You must not have any electronic device unless indicated on the question paper
- Read carefully the instructions on the question paper
- Ask an invigilator if you need extra paper
- Write legibly

**After the examination**
- Complete all the sections above
- Number your pages, and fasten them to this cover sheet with the tag provided
- You may take away your question paper, unless instructed otherwise
- You may not take away any stationery
Practical Matters – Cover sheet

Some people find the cover sheet confusing because the instructions telling you how to fill it in are on the front of the exam paper, NOT on the cover sheet itself. This is because all exams use the same cover sheet, and some subjects want them filled in differently.

To emphasise – **We want a cover sheet per question** (ie 5)

We **do not** want a cover sheet per paper (ie 1), or a cover sheet per section (ie 4)

Please fill in the numbers of *all questions attempted* on **all** cover sheets. This is so we can tell if a question answer gets lost!

**Please write numbers legibly on the cover sheet**

Also – **don’t write your name on your answers or on the cover sheet - candidate number only** (we use anonymous marking)
Practical Matters – Illness/incapacity/mitigating circumstances

- If a problem occurs in the time before the exams that is likely to disturb your revision or performance in the exam itself tell your Tutor asap.
- Your college may submit a warning letter, which will be used as evidence if you apply for an allowance after the exams. (An allowance is a mark or class adjustment granted in certain circumstances, in particular on account of “illness or other grave cause”.)
- If it is a medical matter see a GP as the GP may be asked to provide a note.
- If a problem occurs on the day contact your college Porters’ Lodge.
- If a problem occurs in the exam hall put your hand up and inform an invigilator.
Practical Matters – What can I ask the examiners?

- You can’t ask questions like this:
  - What is the answer to Question 3?
  - Is the answer to Question 3 “x”?
- But you can ask, for example:
  - Is this question correct as printed?

\[
\text{Simplify } F = A\overline{B}.C.D\overline{E} + A.C.D + A.C.F.G\overline{H} + A.B.C.D.E + A.C.D.E + \overline{E} \overline{H}
\]
After the exam – What happens?

• Sorting
• Marking
• Checking
• Practical marks
All of you should have gained the full set of “units of assessed course work” (aka ticks), as specified in the Head of Department’s notices.

The Marking and Classing document says:

“Mark penalties will be applied to act as a deterrent to missing a tick. The Part IA Examiners are supplied with a final tick list. Each missing tick will receive a penalty of 10 marks (10% of a paper). The maximum penalty is 100 marks (one full paper).”

We don’t do this for NST (or PBT)
A problem: We need to add up the marks on your various papers.

So what’s the problem – can’t we just add up the raw marks?

Yes – but it wouldn’t be fair.

Let’s look at the mark distribution for the whole cohort for a random paper.
After the exam - Norm referencing

Some distribution a little bit like this (exaggerated for illustrative purposes)
After the exam - Norm referencing

We try hard to make all questions and thus all papers equally difficult, but this is not easy. If one paper turned out to be “easier”, with a higher overall distribution, the people taking it would be unfairly advantaged (and vice versa).

Also the mark distribution for “essay-type” questions tends to be different from “maths-type” questions.

So – we can’t just add up the raw marks
After the exam - Norm referencing

So what can we do about it?

**Normalise the paper marks**

(aka norm referencing, aka linear piecewise scaling)

We *decree* that 25% of people *must* get 70 marks or above, and 90% of people *must* get 50 marks or above
The Procedure: From the full set of marks for a paper determine the mark at the 25th percentile, \( A \), and the mark at the 90th percentile, \( B \).
After the exam - Norm referencing

The Procedure: From the full set of marks for a paper determine the mark at the 25\textsuperscript{th} percentile, $A$, and the mark at the 90\textsuperscript{th} percentile, $B$.

- If $x \geq A$: $x := 70 + \frac{30(x - A)}{(100 - A)}$
- If $A > x \geq B$: $x := 50 + \frac{20(x - B)}{(A - B)}$
- If $B > x \geq 0$: $x := \frac{50x}{B}$
The Procedure: From the full set of marks for a paper determine the mark at the 25th percentile, $A$, and the mark at the 90th percentile, $B$.

If $x \geq A$: $x := 70 + \frac{30(x - A)}{(100 - A)}$

If $A > x \geq B$: $x := 50 + \frac{20(x - B)}{(A - B)}$

If $B > x \geq 0$: $x := \frac{50x}{B}$

e.g. if $A = 75$, $B = 37$: a raw mark of 80 will become $70 + 30(80 - 75)/(100 - 75) = 76.0$, a raw mark of 50 will become $50 + 20(50 - 37)/(75 - 37) = 56.8$, a raw mark of 30 will become $50.30/37 = 40.5$
After the exam - Norm referencing

We have effectively taken hold of our curve at two points and *skewed* (and possibly translated) it to conform to some "normalised" shape.

This means that the top 25% get marks of 70 and above, the bottom 10% get marks of 50 and below.
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This means that the top 25% get marks of 70 and above, the bottom 10% get marks of 50 and below.

(Note that ordering is preserved, anybody that got a higher raw mark than you still has a higher scaled mark, and likewise for lower)

If this is done on all of your papers then we can fairly add together the marks.
After the exam – add up the marks

...like so.

(Note that NatScis don't do this…)
The NatSci Examiners also norm-reference all marks (including ours). This is because people are used to the idea that e.g., \( \geq 70 \) is a 1st.

However they don’t then add them up.

They use the mark per paper to produce a *percentage rank* (i.e., the top person gets 100, the bottom gets 1).

They then have 4 ranks, 1 per paper, which they add up, and use that rank total to derive a class.

(This is new from 2017)
After the exam – Classing I

We have a total mark, now we need to draw class boundaries

We (CST) follow the rules set out in the Marking and Classing document: www.cl.cam.ac.uk/teaching/exams/classing.pdf

which states that examiners will partition the order-of-merit table thus:

- **First** 25%
- **Upper Second** 55%
- **Lower Second** 12.5%
- **Third and Unclassed** 7.5% (unclassed = mark below 40%)
Examiners will actually use graphs like this, scatterplots, to determine the class boundaries.
Computer Science results will be published on Tuesday July 3rd, in the afternoon.

They will be published on CamSIS.

Initial results will just be the class and paper marks, Directors of Studies will be given more information a day or two later.

(NatScis - different arrangements apply)
Examination Reviews, Informal Mark Check

Once you get your exam marks, if you think we’ve made a mistake you may make an informal request for a mark check.

This should be done through your Director of Studies, who will have to approve it.

For example, if you are sure you should have gained 20 marks on question X, but were awarded 2, then you can ask your DoS to check.

We have done this many times over the years and have never found a recording or addition mistake, these things are double or even triple checked.

NatScis have a similar procedure.
Examination Reviews, Formal Appeals

There is a formal procedure for appeals:

• If you are unhappy about something concerning the conduct of the exam you need to fill in the Representations to Examiners Form within 5 days.
• After the classlist is published if you believe a mistake has been made you need to fill in the Examination Review Form within 28 days of publication.

Your Tutor (or CUSU) can point you at the forms and advise you. Any form received will be handled in accordance with the University Examination Review Procedure.
After the appeals – Uh oh!

It must be stressed that very very few people fail!

Fewer than 1% in Computer Science

The University will not say “You have failed” – it will simply not publish your name in the classlist. However, you may be granted an allowance to remain.

What happens next is up to your college

All will have some kind of internal appeals procedure but unless you are granted an allowance the rules are straightforward and as you would expect.

The regulations do not allow re-sits
This slide is **ONLY** relevant to people reading Computer Science with Mathematics. If you are not such a person ignore it.

Alphas – we don’t use them

You can safely ignore anything your Maths supervisors tell you about Alphas

<table>
<thead>
<tr>
<th></th>
<th>Paper x</th>
<th>Paper y</th>
</tr>
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<tbody>
<tr>
<td>15</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

For the Mathematicians Paper x is better than Paper y. For us they are exactly the same.
Copies of the slides are available as a PDF at my Computer Lab homepage: