

## Natural Science Tripos Part II, History and Philosophy of Science

### Senior Examiner's Report 2022

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Examination: Coursework: One primary source essay (5,000 words, 20%) and one dissertation (8,000 words, 20%; Option A only).  
Open-book examinations: 6 papers offered, with candidates writing three (Option A) or four (Option B).

Numbers: 39 HPS, 3 BBS113, 6 BBS114, 6 BBS107, 8 BBS Major, 9 History SS11, 6 PBS, 13 Phil IB

#### Examiner's meetings

- Preliminary examiners meetings were held to set papers on 9 February and to prepare for the final examinations on 25 May. The Final Examiner's Meeting was held on 21 June. All examiners were present at these meetings, but not the assessors. The final examiners' meeting was also attended by the external examiner.
- At the Final Meeting each candidate was considered. High, low and borderline candidates were discussed. Those candidates falling on the First/Upper Second border were scrutinised particularly closely.

## Report

Thirty-seven candidates sat the HPS Part II examinations in 2021-22 (two withdrew during examinations). This was a significantly higher number than in the preceding years, but back to levels experienced before 2015. Like last year, six Part II papers were offered. Four students chose Option B, writing four papers and a primary source essay, while the rest (33) chose Option A, writing three papers, a primary source essay and a dissertation. The class was less successful compared to previous years, with only about a third (32%) achieving firsts.

It should be noted though, that this result reflects distribution of marks in 2012-2013, when student numbers were at a similarly high level. It is also likely that the continuing pandemic had an impact on lecture attendance and ability of students to work. Beyond that, examiners also had the distinct impression that many students had prepared their 5h open book examinations by relying on lecture recordings and prepared material, producing unimaginative answers as a result that often did not clearly address the question.

Year	First	Upper second	Lower Second	Third	Deserved Honours	Total	A	B
2022	12	24	1	–	–	37	33	4
2021	13	11	–	–	–	24	20	4
2020	14	15	1	–	–	30	29	1
2019	8	5	–	–	–	13	10	3
2018	16	10	2	–	–	28	19	9
2017	12	11	–	1	–	24	19	5
2016	12	17	2	–	–	31	25	6
2015	12	12	1	–	–	25	20	5
2014	15	23	2	–	–	40	33	7
2013	7	29	4	–	1	40	27	13
2012	16	19	1	–	–	37	23	14

Table 1: Distribution of HPS Part II marks, 2012-22

The HPS Part II Examiners also mark the papers for BBS candidates and pass the marks on to the BBS Board where the candidates are classed. Three BBS Minor candidates sat the paper ‘Early Medicine’ (Minor Subject 113), six candidates took the paper ‘Modern Medicine and Biomedical Sciences’ (Minor Subject 114), and six students completed “Philosophy and Ethics of Medicine” (Minor Subject 107). As last year, no student received a first on BBS 113, but all a 2.1; on BBS 114, one student received a first, three a 2.1, and two a 2.2. The one BBS 114 student who chose to write a dissertation achieved a much better mark for it than in the examination (a high 2.1 rather than a 2.2). Of the six BBS 107 candidates, four of received a 2.1, two a 2.2. Performance on all three BBS Minor papers did not deviate significantly from last year’s.

2022 was the first year, in which a BBS Major in HPS was offered. The eight students on this course wrote a dissertation and sat four examination papers: Early Medicine (identical with BBS 113), Modern Medicine and Bio Medical Sciences (identical with BBS 114), Philosophy of Science and Medicine (a combination of questions relating to Papers 4 and 5), and Ethics of Medicine (with questions relating to Paper 6). Students did well on the papers, but less well on their dissertations. For details, see comments below.

Six PBS students took Philosophy and Scientific Practice, three receiving Firsts, one a very strong one, two a 2.1, and one a 2.2. We also examined Philosophy IB students on Epistemology and Metaphysics of Science. This option attracted 13 students. 5 of these received a First, 8 a 2.1. This is a significantly lower proportion of firsts in comparison to last year (12 out of 21), and has again to do with many answers reproducing lecture material rather than addressing the question.

### Class and mark distributions

The class and mark distributions for each assessment element, including each of the papers, are given in Table 2. The number of candidates sitting each paper ranged from five in Paper 5 to 32 in Paper 6. Examiners showed a willingness to use the full range of marks, however performances were relatively even, with the bulk of marks falling in the mid 2.1 range and very few outstanding scripts. Mean and median marks across the six papers varied more than last year, between 64 in Paper 1 and 69 in Paper 5. In comparison to last year's results (Mean P1: 68.1, P2: 69.3, P3: 68.5, P4: 68.8, P5: 69.1, P6: 68.6), students also achieved significantly lower marks, about three points less, with exception of Paper 5, which had a very low number of students, however.

Element	First	Upper second	Lower Second	Third	Fail	Total	Max	Med	Mean
Primary Source Essays	17	16	4	–	–	37	82	69	68.8
Dissertation	19	9	5	–	–	33	86	70	69.2
P1 Early Medicine	2	11	2	–	–	14	75	64	64.4
P2 Science & Empire	8	10	3	–	–	21	74	66	66.1
P3 Modern Medicine	8	10	5	–	–	23	80	65	65.1
P4 Phil. Scient. Practice	7	6	4	2	–	19	77	67	65.1
P5 Epistem. Metaph. Sc	2	3	–	–	–	5	73	69	69.2
P6 Ethics & Politics STM	10	20	2	–	–	32	76	67	66.9

Table 2: Distribution of HPS Part II marks per element of assessment. Note: BBS, PBS, History and Philosophy students are not represented.

Considering class distributions by gender, male candidates performed significantly better than female in terms of absolute numbers. The mean for men was 68.0, that for women 66.2. As Table 3 shows, numbers were very even with one more woman than men taking HPS Part II.

Year	First		Upper second		Lower Second		Total		Total candidates
	M	F	M	F	M	F	M	F	
2022	8	4	9	15	1	–	18	19	37
2021	4	6	9	5	–	–	–	–	24
2020	7	6	7	9	–	1	14	16	30
2019	3	5	4	1	–	–	7	6	13
2018	8	8	4	6	1	1	13	15	28
2017	3	9	4	7	–	–	7	17	24

2016	5	7	8	9	1	1	14	17	31
2015	4	8	6	6	1	–	11	14	25

Table 4: Distribution of HPS Part II class marks by gender.

### Examining practice

In accordance with customary practice the examination questions were set in the beginning of Lent term following consultation with lecturers, supervisors and paper managers. The External Examiner Sabina Leonelli provided valuable feedback on all of the questions, and efforts were made to ensure both that exam questions were properly supported by supervisions and lectures while encouraging independence of thought by not closely mirroring questions answered in supervisions and lectures.

Marks and comments for individual papers were entered into pre-circulated spreadsheets, enabling the ready analysis of data and its collation for final classification. All elements of the examination were blind double-marked with examiners meeting to agree on final marks. The external examiner was asked to verify that the agreement reached was reasonable in cases where there were significant divergences in original marks. The external examiner was also asked to review high and low performances, sample middle-of-class performances, and review marks across borderlines for primary source essays and dissertations as well as unseen examinations in cases where the agreed mark fell into a lower class. They were given access to all scripts and thus also had a chance to consider overall performance of candidates with a view on uneven performance and anomalies.

In contrast to 2021, there were no changes to examinations for health and safety reasons and to mitigate for adverse effects of the Covid pandemic. The department decided however to continue with online open book examinations, with a 5h, rather than 24h hour window, and a word limit per answer of 1500.

Open book online examinations worked smoothly again, with no technical difficulties reported.

Due to the contingencies of scheduling 24h online examinations, examination dates were spread out, with the last exam scripts available twelve days ahead of the Final Examiner's meeting. Due to high student numbers, workload per examiner was higher than in previous years, with each examiner marking 40-60 scripts, 10-15 dissertations, and 8-12 primary Source essays.

Apart from this, the administration of examinations went very smoothly with no significant problems reported in their conduct. It is important to keep track of the increasing number of single papers on offer, shared in various combinations with other triposes, and in one case (History Specified subject 11) assessed by another department. Communication from and with other departments was good, however, and oversight possible by keeping all relevant documentation ready at hand on a shared drive. More generally the examiners acted with great efficiency and we thank Jane Clare, David Thompson and the external examiner for their excellent work.

### Comments on performance

#### *Dissertations*

As in previous years the majority of students chose to write a dissertation, and as Table 2 shows, students were very successful in this component, especially in comparison with the examination papers. The four students who chose Option B (without a dissertation) received an average of 62.4, performing significantly worse than Option A students with an average of 67.6. In comparison with performance on examination papers, this shows clearly that students were able to achieve some great results when producing original work. There were no cases in which dissertation results alone lowered the overall mark. In contrast to the previous year, restricted access to research materials and less opportunity for informal exchange due to the pandemic does not seem to have had an adverse effect on dissertation writing. The Frances Willmoth Prize for excellence in the dissertation was given to one student this year, who received an 86 for outstanding work.

### *Primary Source Essays*

Performances on the Primary Source Essays was even this year, with about as many Firsts as 2.1s, and only 4 students receiving a 2.2 (see Table 2). To avoid that students oversubscribe to popular primary source essays, student numbers were capped at eight for each primary source essay this year. Distribution of marks varies considerably over primary sources, but due to the low absolute numbers, it is difficult to draw any firm conclusions from this (see Table 4). In the last year, the lowest marks had been received by students who signed up for the most popular primary source seminar, and this effect seems to have been mitigated by this measure. As in the last year, students seemed to have understood well what was expected from them in this course.

	First	Upper second	Lower Second	Third	Total
Linnaeus	–	5	1	–	6
Du Bois	4	–	1	–	5
Evolutionary Theory	1	2	–	–	3
Covid-19	4	4	–	–	8
Science for the People	5	3	–	–	8
Sphere of Manilius	3	–	1	–	3
Direction of Time	1	1	2	–	4

Table 5: Distribution of Primary Source Essay marks.

### *Open-book examinations*

It remains notable that in all papers, some questions proved more popular than others, but differences were less extreme than last year. Across papers, assessors noted that many answers seemed to use prepared material, often resulting in answers that did not directly address the question. While no clear plagiarism cases emerged, assessors agreed that this was likely the reason why performance this year dropped by about three points across papers (see discussion of Table 2 above). For the following remarks on performance on each individual paper, keep in mind that absolute numbers are low and thus have little statistical significance.

#### **Paper 1**

Only one question was left unanswered, Q4 on “poetry as an effective medium for communicating scientific ideas”, whereas Q5 on the medical marketplace proved by far the most popular, but resulted in somewhat standardized answers. Q7 on “the impact of translation” scored particularly good answers, whereas students struggled with Q1 (on Francis Bacon) and Q8 (on Newton). Only two out of fourteen students received a first on this paper, resulting in the lowest average result (64.4).

### Paper 2

All questions on this paper received answers, although Q1, Q7 and Q12 attracted one only. Q3 on the end of empires was the most popular, closely followed by Q8 on the petrochemical industry and Q10 on translation under the Qing dynasty. Answers to the latter reproduced well-established narratives, however, and students did not achieve markedly better on the questions.

### Paper 3

All questions received answers, with Q8 on social movements in medicine after WWII being the most popular. Students achieved the best results by far in answering Q6 on opposition to changes in hospital management. It is notable that few students engaged with Q3, Q11 and Q12, all pertaining to themes covered in Lent weeks 5-8, but that some of their answers produced the highest scores. Answers to Q10 on eugenics produced particularly low marks, due to lack of detail and reproduction of established wisdom only.

### Paper 4

Questions were answered very evenly on this paper, with all questions receiving three or more answers. Q5 on physics and metaphysics and Q9 on the concept of welfare were very popular and also received the best marks, whereas the equally popular Q8 on rational choice modelling had some very poor answers. However, in these cases students had used material in their answers that was of little or no relevance to the question.

### Paper 5

As in the previous year, this paper received the highest average mark (69.2). Given the low number of students taking this paper, questions were answered surprisingly evenly, with only one question (Q8 on the "problem of old evidence") not answered, demonstrating good engagement of students across the paper. Best results were achieved on Q9 on "inter-field reduction".

### Paper 6

As in the previous year, this paper had the highest number of students (32) resulting in an even distribution of marks. All questions received answers, the most popular being Q8 (on the Nuffield Council on Bioethics) and Q10 (on the argument from inductive risk), and the least popular Q11 (on colonial origins of climate data) and Q12 (on scientific experiments). The latter two questions again cover topics taught in the second half of Lent term.

### BBS Minor

All three BBS minor papers showed good engagement across the course, with little clustering around particular questions. In contrast to last year, when the majority of marks fell within a narrow range of high 2.0s and low, there were quite a few 2.2s this year, largely due to reproducing lecture content. Overall, the distribution of marks on each of the three BBS papers followed that of their parent papers. BBS117 was also borrowed by History students (Special Subject 11), but examiners of this report to the History examinations board.

### BBS Major

This new offer from the department was taken up by eight students who all did quite well, with marks on individual elements ranging from 59 to 78. In the examinations, all four papers taken by BBS Major students showed good engagement across the range of

questions, and with the exception of the Early Medicine paper (BBS Major 13\_1), average marks achieved even excelled those on the parent papers, especially in the case of the Ethics of Medicine paper with an average of 70.6 (BBS 13\_4; see table 6). The opposite was the case for dissertations; here, the average was just 62.25, strikingly lower than the average for HPS students (69.3). It can be assumed that this pattern is due, on the one hand, to prior experience with certain subjects that BBS students may have had, while there is a lack of skills needed for achieving on dissertations.

BBS Options	Mean	HPS	Mean
BBS Major 13-1	63	P1	64.4
BBS Major 13-2	66.4	P3	65.1
BBS Major 13-3	68.4	P4	68.8
BBS Major 13-4	70.6	P6	68.6
BBS Major Dissertation	62.3	Diss	69.3
BBS Minor 113	62.5	P1	64.4
BBS Minor 114	63	P3	63
BBS Minor 45	63.8	P6	68.6

Table 6: Comparison of average marks between BBS and HPS students.

### Single Paper Options

Six PBS students borrowed Paper 4, engaging evenly with questions and achieving some excellent results constituting an average of 68.7 that lies three points above that achieved in the parent paper. 13 Philosophy IB students borrowed Paper 5 and these papers were double-marked in line with changed marking procedures in Philosophy. Performance was almost the same as that of HPS Students, with an average mark of 68.5 only very slightly below that of HPS students taking the same paper.

### Summary of Recommendations

1. College Directors of Studies, Examiners and Administrators need to be clear about the relations between different single papers and core Part II papers, with Examiners noting also their different marking responsibilities (e.g. for History Special Subject 11) and diverse reporting responsibilities for BBS, PBS, HSPS and Philosophy IB single paper options. Good communication and record keeping is key to avoid delays in reporting.
2. We recommend the continued use of formatted mark books stored on a shared drive to simplify the communication of markers comments and collation of marks. This should include, as far as possible, examiners' notes on individual marking papers.
3. 5h online open books examinations in 2021-22 avoided the confusion among students felt in 2020-21 about the nature of this format and what was expected from them in terms of polished answers. On the other hand, it seems that the format still tempts students to build a stock of prepared material when revising for the papers, and relying on this for their answers. Lecturers and supervisors need to be clear that this strategy will not work to achieve good results, and students need to be reminded that regular attendance of lectures is key to orient themselves and set a rhythm of engagement, but that reproduction of lecture content, whether from slides and lecture notes, or from lecture recordings, is not what is expected of

students. For the future, alternative assessment methods should be considered, including a return to invigilated, written in-person exams.

4. Examiners should keep in mind that the scheduling of examinations may result in a large number of scripts having to be marked shortly before the final examiners' meeting. The senior examiner will also make sure that enough examiners and assessors are recruited so that excessive workloads can be avoided.
5. Examiners should continue to consider overlap between questions within and across papers, and endeavour to set questions that encourage independent and critical approaches on the basis of course materials rather than closely repeating supervision topics and lecture contents.
6. Performances on BBS and other single-option papers (perhaps with exception of Philosophy IB) suggests the value of focusing these students on how to think and write historically and philosophically. They might also benefit pedagogically from working with a common supervisor throughout the course. This is particularly true of BBS Major students writing dissertations. The Department should consider whether some extra training on how to write an HPS dissertation can be offered to these students.
7. Candidates are advised to address all elements of what are usually carefully worded questions. In particular, they should avoid using prepared material for their answers.