

Natural Science Tripos Part II, History and Philosophy of Science

Senior Examiner's Report 2023

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Examiners: Lewis Bremner, Philippa Carter, Stephen John, Dmitriy Myelnikov, Charu Singh, Jacob Stegenga (dispensed), Alessandra Basso (assessor), Tom McClelland (assessor), Edwin Rose (assessor), Sabina Leonelli (external examiner)

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: 26 HPS, 17 BBS Minor 45, 4 BBS Minor 65, 5 BBS Minor 66, 8 BBS Major 13_1-4, 12 History SS11, 2 PBS, 2 HSPS, 18 Phil IB

Examiner's meetings

- A preliminary examiners meeting was held to set papers on 20 February. Subsequent meetings were cancelled due to the marking and assessment boycott. After the boycott was called off on September 6, examiners' workload was discussed by email, and a deadline set for return of agreed marks on coursework and exams by September 29. Sample work to be sent to the examiner was agreed on by circulation, and sent to the external on October 5. The final examiners' meeting was held online on Oct 11. All examiners were present at this meeting, except Jacob Stegenga who was granted a dispensation by the Vice-Chancellor. The final examiners' meeting was also attended by the external examiner.
- At the final examiners' meeting each candidate was considered. High, low and borderline candidates were considered.

Report

Twenty-six candidates sat the HPS Part II examinations in 2021-22 (six intermitted). This was a somewhat lower number than in the preceding year, but in the range experienced since 2020. 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 (22) chose Option A, writing three papers, a primary source essay and a dissertation. The class was again less successful compared to years 2015 to 2021, with only a third of students achieving firsts. (It should be noted though, that this result comes close to distribution of marks prior to 2015).

It is likely that the switch to online open-book exams during the Covid19 pandemic has had an impact on students prepare for exams. Examiners noted that a large number answers looked “prepared” resulting in competent but largely derivative answers. Examiners had the distinct impression that many students had prepared their 5h open book examinations by relying on key readings and lectures, 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
2023	9	16	1	–	–	26	22	4
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

Table 1: Distribution of HPS Part II marks, 2013-23

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. Four BBS Minor candidates sat the paper ‘Early Medicine’ (BBS Paper 65), five candidates took the paper ‘Modern Medicine and Biomedical Sciences’ (BBS Paper 66), and seventeen students completed “Philosophy and Ethics of Medicine” (BBS Paper 45). As last year, no student received a first on Paper 65, two a 2.1 and a further two a 2.2; on Paper 66, one student received a first, three a 2.1, and one a 0 due to late submission. Of the seventeen candidates who took Paper 45, three received a first, ten a 2.1, three a 2.2, and one a fail due to submission of one answer only. The one BBS Minor student who chose to write a dissertation achieved a much better mark for it than in the examination (a first rather than a 2.2). Performance on all three BBS Minor papers did not deviate significantly from last year’s. There was a slight increase in the number of firsts, and with an average of 60, students taking paper 65 did slightly worse than in the previous year.

2023 was the second 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 Paper 65), Modern Medicine and Bio Medical Sciences (identical with Paper 66),

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 in exams, but and also well on dissertations, in contrast to last year. For details, see comments below.

One Classics student borrowed Paper 1, receiving a 2.1. Two PBS students took Philosophy and Scientific Practice, both receiving a First. Two HSPS student borrowed Paper 5 and 6 respectively, both receiving a 2.1. We also examined Philosophy IB students on paper 5. This option attracted 18 students. 6 of these received a First, 11 a 2.1, and one failed due to incomplete answers. This continues to be a significantly lower proportion of firsts in comparison to 2021 (12 out of 21) and seems to have 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 eleven in Paper 2 to 17 in Paper 6, so a more even distribution than last year. Examiners showed a willingness to use the full range of marks, however performances were relatively even, with the bulk of marks falling in the 2.1 range and very few outstanding scripts. Mean and median marks across the six papers varied slightly less than last year, between 64.6 for Paper 1 and 67.1 for Paper 5. In comparison to last year's results (Mean P1: 64.4, P2: 66.1, P3: 65.1, P4: 65.1, P5: 69.2, P6: 66.9), students yet again achieved lower marks on average, with exception of Paper 3.

Element	First	Upper second	Lower Second	Third	Fail	Total	Max	Med	Mean
Primary Source Essays	12	13	1	–	–	26	81	69	69.2
Dissertation	14	8	–	–	–	22	85	71.5	71.5
P1 Early Medicine	5	8	3	–	–	16	75	65.5	64.6
P2 Science & Empire	4	4	2	–	1	11	79	67	63.5
P3 Modern Medicine	5	8	1	–	–	14	75	67.5	67.1
P4 Phil. Scient. Practice	3	8	1	–	–	12	73	66	65.9
P5 Epistem. Metaph. Sc	3	7	1	1	–	12	73	68.5	66.0
P6 Ethics & Politics STM	5	9	2	1	–	17	72	67	63.4

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, scoring twice as many firsts, just as in 2022, with equal numbers of male and female students taking the course. It is difficult to say whether this constitutes a trend given the small number of students, but it is notable that before 2022, numbers have been more varying. It may be the case that the exam format of 5h open book exams favours students ready to take risks.

Year	First		Upper second		Lower Second		Total		Total candidates
	M	F	M	F	M	F	M	F	
2023	6	3	7	9	0	1	13	13	26
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

Table 3: 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 feedback on all of the questions, and efforts were made to ensure 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.

Despite these efforts, the BBS Major Paper 13_3 contained three questions that were not relevant to the lectures taught on this paper. The relation of this paper to the HPS papers is complex, taking a combination of 24 lectures from Paper 4 and 5. Two students contacted the senior examiner about this, and it was decided that the exam papers would be marked as normal but mitigation measures, if appropriate, would be discussed and decided at the final examiners' meeting (see below for further details).

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 afterwards 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, 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.

Open book online examinations worked smoothly again, with no technical difficulties reported. One student had accidentally uploaded the wrong set of questions. The exams team at Student Registry contacted the student and advised us that the student was able to provide them with the right script and that the timestamps on the document indicated that it was last modified within the assessment timeframe. The paper was therefore marked as usual.

Due to the marking and assessment boycott, examination only resumed at the beginning of September, with a deadline for agreed marks set for September 29. This left three weeks for marking to be done in a timely yet thorough manner. Workload per examiner was slightly

less than last year's, with each examiner marking 40-50 scripts, 6-9 dissertations, and 6-8 primary source essays. Examiners confirmed that the window left between the end of the marking and assessment boycott and the deadline for agreed marks on September 29 left enough time to carry out their duties with the usual diligence.

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. While on the latter, students achieved an average mark of 65.1, the average for dissertations was 71.5. The four students who chose Option B (without a dissertation) received an average of 66.4, performing slightly worse only than Option A students with an average of 67.3. In comparison with performance on examination papers, this shows clearly that students were able to achieve some great results when producing original work. Three dissertations were truly outstanding, combining excellent writing and structure/argument with originality and independence, suggesting work of a category of its own. There were no cases in which dissertation results alone significantly lowered the overall mark. The Frances Willmoth Prize for excellence in the dissertation was given to one student this year, who received an 85 for outstanding work.

Primary Source Essays

Performances on the Primary Source Essays was even this year, with about as many Firsts as 2.1s, with exception of Evolutionary Theory and Galileo were out of four students one only received a first (see Table 4). To avoid that students oversubscribe to popular primary source essays, student numbers were capped at eight for each primary source essay. 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. It is notable, however, that with primary sources as well, students achieved much better marks with an average of 69.2 as compared to 65.1 for exams. Students seemed to have understood well what was expected from them in this course, and there is again evidence that being tasked with producing original work produced the best results, with one student again receiving a mark over 80 for their primary essay.

	First	Upper second	Lower Second	Third	Total
Linnaeus	3	3	–	–	6
Du Bois	1	1	–	–	2
Imperial Maritime	1	1	–	–	2
Evolutionary Theory	1	3	–	–	4
Inequality	–	1	–	–	1

Galileo	1	2	1	–	4
Covid	4	3	1	–	8

Table 4: Distribution of Primary Source Essay marks.

Open-book examinations

It remains notable that in all papers, some questions proved more popular than others. 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, Q6 on the value of “practice of first-hand observation”. A-type questions were answered evenly, and Q1 on whether “medical and scientific knowledge [were] ever separate from religion in pre-modern Europe” received the highest average mark. Q4 on the “anatomical renaissance”, Q7 on “who was permitted to practise medicine” and Q10 on “the emergence of the Atlantic World” were the most popular, but also received some of the poorest answers in the low 2.2 range. Students struggled with Q7 on “public sphere”. It was evident from answers to Q4 in particular, that students had relied on some unsuitable sources garnered from the internet, which resulted in overly whiggish accounts.

Paper 2

Only one question was left unanswered, Q6 on “post-Second World War developments in computing technology”, and one received one answer only, Q12 on “anthropologies of exchange”. Q4 on why “biogeography [became] a “big science” was particularly popular and also received some of the best marks and the highest average. One student answered one question only and therefore failed this paper. Again, for the majority of answers there was a tendency to reproduce received ideas, without effort to build a cogent argument. But there were some outstanding answers also, showing ability to use ideas garnered from readings to produce an original account.

Paper 3

This paper had the highest average mark (67.1). All questions received answers, with a good distribution across the paper. Q12 on “molecularization” of biology received two answers only, whereas Q10 on the impact of “global Cold War tensions” was the most popular with nine answers. As in Paper 2, it was a question on broad developments, but with a specific anchor to build the answer on – Q4 on the “changing role of instruments in the diagnosis of disease between 1780 and 1920” that received the best answers. Students struggled with satisfactory answers for Q2 on “practices of visualisation” and Q7 on physiology.

Paper 4

Questions were answered very evenly on this paper, with exception of Q12 on “addictive behaviours” which was by far the most popular, receiving 10 answers. The distribution of results showed no clear pattern, except for the fact that students scored less well on A-type questions. The best answers were given in response to Q4 on the “reciprocal account of causation”, Q9 on assessment of “benefits and harms of medical interventions,” and Q12. Q5 on physics and metaphysics and Q9 and 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. It was notable that the most popular question, Q12, also produced results below the average across the paper.

Paper 5

All questions received answers, with Q4 on “most enduring aspects of scientific knowledge” and Q10 on “causal and non-causal explanations” at the lower end (one answer), and Q6 on “scientific realism” and Q7 “the connection between lawhood and simplicity” at the upper end of popularity (eight answers), demonstrating good engagement of students across the paper. Distribution of marks across answers showed no clear patterns, and answers in the mid- and lower range of marks rather surveyed philosophical positions instead of building an argument. One student delivered unfinished answers to two questions, resulting in a third.

Paper 6

Two questions, Q2 on whether we should “insulate science from society” and Q9 on “the most significant ethical challenge to mitochondrial donation technologies”, proved very popular (thirteen answers), while Q4 on the “Mertonian versus the Fleckian approach to sociology of science” received no answer and Q6 on “science and politics of climate change” one only. As in the previous year, this paper had the highest number of students (17) although closely followed by Paper 1 (16) and Paper 4 (14). The highest total mark achieved was a 72 and marks showed distinct clusering at the higher end of the 2.1 range. Again, it is very notable that the most popular questions did not received the best answers, but rather produced results close to the average across this paper.

BBS Minor

All three BBS minor papers showed good engagement across the course, with little clustering around particular questions. Marks are distributed evenly, but in comparison with HPS papers, the proportion of firsts and average marks are significantly lower (see Table 5 and 6). One student submitted their exam paper late and therefore received a fail. One student also submitted a dissertation which received a first. BBS 65 was also borrowed by History students (Special Subject 11), but examiners of this report to the History examinations board.

	First	Upper second	Lower Second	Third	Fail	Total
BBS 65 Early Medicine	–	2	2	–	–	4
BBS 66 Modern Medicine	1	3	–	–	1	5
BBS 45 Philosphy and Ethics of Medicine	3	10	3	–	–	2

Table 5: Distribution of marks for BBS minor papers.

BBS Major

This offer from the department was introduced last year and was again taken up by eight students who all did well, and markedly better than last year, especially on their dissertations. All four exam papers taken by BBS Major students showed good engagement across the range of questions, and average marks excelled those on the HPS parent papers, especially in the case of the Ethics of Medicine paper with an average of 70.6 (BBS 13_4; see Table 6). In stark contrast to last year, this also was true for dissertations; here, the average

was 70.2, one point more than HPS students (69.3). It seems that informing BBS students of what is expected from them has worked much better this year than last.

BBS Options	Mean	HPS	Mean
BBS Major 13-1	65.3	P1	64.4
BBS Major 13-2	67	P3	65.1
BBS Major 13-3	69.6	P4	65.1
BBS Major 13-4	68.8	P6	66.9
BBS Major Dissertation	70.2	Diss	69.2
BBS Minor 65	60	P1	64.4
BBS Minor 66	54 (67.5)*	P3	65.1
BBS Minor 45	62.7	P6	66.9

Table 6: Comparison of average marks between BBS and HPS students. * Average mark in parentheses indicates average mark discounting receiving a zero for late submission.

Single Paper Options

One Classics student borrowed Paper 1, receiving a 2.1. Two PBS students borrowed Paper 4, both receiving a clear First. Two HSPS students borrowed Paper 5 and 6 respectively, both receiving a 2.1. 18 Philosophy IB students borrowed Paper 5, with six scoring a First, eleven a 2.1, and one student failing due to incomplete answers. Performance was slightly better than that of HPS Students, with an average mark of 68.0 (the fail being discounted).

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. There is clear evidence that open book online examinations tempt many students to build a stock of prepared material when revising for the papers, and relying on this as well as internet sources and possibly AI tools for preparing their answers within the five-hour window. 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.
4. For the future, the board of examiners strongly recommends adopting alternative assessment methods. The format that is currently being discussed within the department, i.e. to replace open book exams with a combination of supervision essay portfolios and a viva voce examination, seems the best way to meet the challenges that digital technologies (including AI) pose to online exam formats.

5. In this year, as in previous years, examiners have been following best practice in prioritizing ideas and argument over presentation (e.g. orthography or clarity of language), also in order to avoid bias against student with specific learning disabilities. This should be clearly formulated as a policy in the Department's Guidelines for Undergraduate Examinations. The Department should also seek clear assurance from the University that SSD's are communicated in a timely manner to examiners.
6. 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.
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.