

Natural Science Tripos Part II, History and Philosophy of Science

Senior Examiner's Report 2021

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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: 24 HPS, 4 BBS113, 2 BBS114, 7 BBS107, 2 Classics, 11 History SS11, 2 HSPS, 2 PBS, 21 Phil IB

Examiner's meetings

- Preliminary examiners meetings were held to set papers on 24 February and to prepare for the final examinations on 19 May. The Final Examiner's Meeting was held on 22 June, with a preparatory meeting preceding on May 14. 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

Twenty-four candidates sat the HPS Part II examinations in 2020-21 (one withdrew during the examination period). This is slightly down from the preceding year (29), but in line with years preceding 2018-19, when numbers were particularly low. 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 (20) chose Option A, writing three papers, a primary source essay and a dissertation. The class was quite successful compared to previous years, with more than half (54%) achieving firsts. *It should be noted, though, that examiners adjusted the class boundary between First and Upper Second to 69 in line with university wide Covid mitigation policy to ensure cohort equity with the average distribution of marks in the three years preceding the Covid 19 pandemic (2017-2019).*

Year	First	Upper second	Lower Second	Third	Deserved Honours	Total	A	B
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
2011	11	25	3	–	–	39	28	11

Table 1: Distribution of HPS Part II marks, 2011-20

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 candidates sat the paper ‘Early Medicine’ (Minor Subject 113), and two candidates took the paper ‘Modern Medicine and Biomedical Sciences’ (Minor Subject 114). As last year, no student received a first on BBS 113, but all a 2.1; on BBS 114, both students received a 2.1 as well.

Seven students completed “Philosophy and Ethics of Medicine” (BBS Minor Subject 107). Three of these students received firsts, three a 2.1, and one a 2.2. The one dissertation written by one of these BBS students received a strong first. Table 2 shows that class performances are slightly up from previous years, but with low numbers. Student numbers continue to remain lower in comparison to the heydays of the History and Ethics of Medicine paper it succeeded (33 in 2012).

Year	First	Upper second	Lower Second	Third	Fail	Total
2021 (PEM)	3	3	1			7
2020 (PEM)	4	6	–	–	–	10
2019 (PEM)	2	8	1	–	–	11
2018 (PEM)	2	6	–	–	–	8
2017 (PEM)	4	7	–	–	–	11
2016 (HEM)	3	2	–	–	–	5

2015 (HEM)	3	7	2	–	–	12
2014 (HEM)	2	10	3	–	–	15
2013 (HEM)	7	11	2	1	1	22
2012 (HEM)	5	26	2	–	–	33

Table 2. Distribution of HEM/PEM marks 2011-20

Two Classics students borrowed the Early History of Science, Medicine and Technology Paper, one receiving a First, the other a 2.2. Two HSPS students sat Ethics and Politics of Science, Technology and Medicine, one receiving a solid 2.1, the other a 2.2, and two PBS students took Philosophy and Scientific Practice, receiving Firsts, one a very strong one. We also examined Philosophy IB students on Epistemology and Metaphysics of Science. This option attracted 21 students. 12 of these received a First, 9 a 2.1, and 1 a 2.2, which is in line with the results from the previous year, when this option was first run.

Class and mark distributions

The class and mark distributions for each assessment element, including each of the papers, are given in Table 3. The number of candidates sitting each paper ranged from five in Papers 1 to 13 and 18 people in Papers 3 and 6 respectively. Examiners showed a willingness to use the full range of marks, however performances were relatively even, with many good and very good performances but only few outstanding scripts. Mean and median marks across the six papers are in broad agreement. Most importantly, these show no marked disagreement in comparison to last year's results (Mean P1: 69.6, P2: 70.5, P3: 68.11, P4: 69.3, P5: 71, P6: 68). P1 and P3 show a slightly low mean result, but P1 had only 5 students, and the mean in P3 is skewed by an outlier.

Element	First	Upper second	Lower Second	Third	Fail	Total	Max	Med	Mean
Primary Source Essays	12	11	1	1	–	24	75	69	68
Dissertation	8	12	–	–	–	20	78	68.5	69.3
P1 Early Medicine	3	7	–	–	–	10	75	68.5	68.1
P2 Science & Empire	8	7	–	–	–	15	75	70	69.3
P3 Modern Medicine	7	6	1	–	–	14	76	68	68.5
P4 Phil. Scient. Practice	7	3	–	1	–	11	75	71	68.8
P5 Epistem. Metaph. Sc	3	5	–	–	–	8	80	68	69.1
P6 Ethics & Politics STM	8	8	1	–	–	17	80	69	68.6

Table 3: Distribution of HPS Part II marks per element of assessment. Note: Classics, PBS, HSPS and Philosophy students are not represented.

Considering class distributions by gender, female candidates performed slightly better than men in terms of absolute numbers. The mean for men was 69.1, that for women 68.7, however. As Table 4 shows, numbers were very even with two more men than women (13/11) taking HPS Part II.

Year	First		Upper second		Lower Second		Total		Total candidates
	M	F	M	F	M	F	M	F	
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
2014	7	8	10	13	1	1	18	22	40

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 Simon Werrett 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.

There were a number of changes to examinations in 2020-21 for health and safety reasons and to mitigate for adverse effects of the Covid pandemic.

- Examinations were moved from unseen written exams to open-book exams with online release of papers and submission of scripts within a set timeframe of 24h.
- Primary Source Essays were granted a 2-week extension until 15 February.
- Questions to be chosen from in each examination paper was set at 12 (as in years prior to the pandemic), but number of required answers was reduced from 4 to 3, and papers were not split into A and B questions.

Open book online examinations worked absolutely smoothly again, with no technical difficulties. Students expressed concerns, however, about the 24h window and the pressure for polished answers they felt this window implied.

Due to the contingencies of scheduling 24h online examinations, examination dates were spread out more this year again than in normal years, with some exam scripts only available a week ahead of the Final Examiner's meeting. A preliminary examiners' meeting was therefore scheduled to agree marks for the remaining papers ahead of the final examiners' board.

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 cases (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 Mary Howe, 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, but as Table 3 shows, students were not markedly more successful in this component in comparison with the others. The four students who chose Option B students (without a dissertation) received an average of 71.5, performing significantly better than the Option A average of 68.1. There were three cases in which the dissertation result clearly lowered the overall mark, but also a one in which the dissertation improved it. It is likely that restricted access to research materials and less opportunity for informal exchange due to the pandemic impacted on dissertation writing. The Frances Willmoth Prize for excellence in the dissertation was shared by two students this year, who received a 78 and 77 respectively for outstanding work.

Primary Source Essays

Performances on the Primary Source Essays were less even than in previous years, with two students receiving a Lower Second and Third respectively (see Table 3). It is notable, that these lower marks were received by students who signed up for the most popular primary source seminar (Sexual Desire). There were no essays that were marked down because of lack of engagement with the primary source, so students seem to have understood better than in previous years what was expected from them. As in previous year, students clearly clustered around two sources, with the remaining three attracting two students each only (see Table 5).

	First	Upper second	Lower Second	Third	Total
Board of Longitude	–	2	–	–	2
Direction of Time	–	2	–	–	2
Evolutionary Theory	1	1	–	–	2
Science for the People	5	2	–	–	7
Sexual Desire	5	4	1	1	11

Table 5: Primary Source Essay Distributions

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. For the following remarks on performance on each individual paper, keep in mind that numbers are low, so numbers have little statistical significance.

Paper 1

Only one question was left unanswered, Q8 on “changes in the publishing industry in the

Ming and Qing dynasties". Q7 on "influences on Chinese medicine in the imperial period" scored particularly good answers, whereas students struggled with Q1 (on changes in astronomy) and 4 (on health experiencers of "people who did not write things down"). Relatively few students received a first on this paper, resulting in the lowest average result (68.1). The best achieving answers showed good command of historical material combined with application of historiographical frameworks from global and social history of medicine and science. Poor answers lacked organization.

Paper 2

Q12 on the Manhattan Project was the most popular, but Q6 on "rangaku" and Q11 on "natural resources" followed suite, with good engagement across questions (all received answers). The best answers showed analytical acuteness and attempted to answer the question methodologically, whereas poor results were largely due to poor selection of examples addressing the question clearly. Like last year, particularly impressive results were achieved on questions relating to science in east Asia.

Paper 3

Q10 and Q11 on modern biology received no answers, but engagement with the remaining questions was even, with Q7 on gendered application of reproductive technologies receiving most answers and some of the best results. This shows again, that students like, and perform best on, questions that allow them to develop some critical edge. Good answers impressed in particular in terms of the clear grasp they demonstrated over detailed historical knowledge. Poor results were due to convoluted arguments and overdue focus on specific examples not clearly related to question.

Paper 4

Q9 and 10 on relativity theory and causation in contemporary physics received no answer, whereas Q11 on the health concept was particularly popular. Answers to the latter achieved quite a number of low marks, however. It is notable that, in this paper, some of the less popular questions received some of the best answers, including one that scored an 80 for Q7 on mental disorders as physical disorders. In general, good answers were based on a clear understanding of key concepts and articulated convincing arguments. The lowest-scoring answers failed to address the question and demonstrated poor understanding.

Paper 5

This paper received the highest average mark (69.1). Three questions – Q2 on principles of Bayesian reasoning, Q4 on epistemic voluntarism, and Q8 on inter-theoretic induction – received no answers, whereas Q5 on explaining scientific success was the most popular. The pattern that the most popular questions do not receive the best results repeats itself in this paper. Addressing the question from an interesting angle and efficient use of concrete examples resulted in the best answers.

Paper 6

As in the previous year, this paper had the highest number of students (17) resulting in an even distribution of marks. Only one question (Q1 on validity and credibility) received no answer, and quite a few of the more popular answers (Q9 on scarce vaccines) received low marks. Excellent answers were clearly introduced and well signposted, and the efficient use of concrete examples again proved to be a condition of success.

BBS 113 (Early Medicine)

Given the low number of students taking this paper (4), engagement across questions was good, with only four questions not receiving an answer (Q7, Q8, Q11 and Q12). The majority of marks fell within a narrow range of high 2.1s and low Firsts, and all candidates received a 2.1, three at the upper end (69), one at the lower (60). This paper was borrowed by History students (Special Subject 11), but examiners of this report to the History examinations board.

BBS 114 (Modern Medicine and Biomedical Science)

Only two students took this paper this year, answering the same questions (Q7 and Q12) in two cases. Results were good but unimpressive (64 and 68), with little variation in individual marks.

BBS 107 (Philosophy and Ethics of Medicine)

Performance on this paper was good (see table 2). With seven students only this year, engagement across questions was sufficiently even, with only three unanswered questions (Q9, Q11 and Q12). Marks ranged from high 2.1s and low Firsts, but one candidate received a 2.2 for answers that seemed to be based on prepared material and did not clearly address the question.

Single Paper Options

2 Classics, 2 PBS, and 2 HSPS students borrowed Paper 1, 4 and 6 respectively. Results were uneven: One Classics student received a 70, the other a 58, both PBS achieved a First (one of them an 80), while the marks for HSPS students were less impressive (58, 68). In addition, for the second time, 21 Philosophy IB students borrowed Paper 5. Unlike last year, 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 69.6 and a median of 71 (cf. Table 3).

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. This will be all the more important, as new options (like the BBS major) are added to the department's teaching program.
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. 24h online open books examinations in 2020-21 created confusion among students about the nature of this format and what was expected from them in terms of polished answers. The time frame should be reduced to ensure closeness to the traditional exam format.
4. Should online open-book examinations be used again, 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.

5. Basic statistical analysis of marks prior to examiners' meetings will help to confirm calibration of different pairs of 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. 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.
8. Candidates are advised to address all elements of what are usually carefully worded questions. In particular, they should avoid using prepared material for there answers.