

# Teaching Committee report to the Faculty Board

## External Examiners' reports, 1999 (Draft)

### Introduction

The Committee met three times to consider the examiners' reports on the 1999 Tripos examinations. It noted with pleasure that the External Examiners, without exception, commented favourably both on the examination process and also on performance of the candidates. Comments such as 'scrupulous professionalism', 'impressive standard', 'high-quality and well-taught students' occur throughout the 6 reports.

The Committee's response to the External Examiners' reports is as follows.

### Part IA, External Examiner's report

1. Professor Partington comments that he had very little time to study the draft questions before the February meeting. The Committee *recommend* that the Chairs of all parts of the Tripos be reminded of the importance of keeping to the timetable, and ensure that they allow at least a day for External Examiners to look at scripts.  
recommendation
2. Professor Partington points out that only one person (David Harris) appears to know how to generate the mark list from the computer database. The Committee *recommend* that the Faculty Board consider whether anything can reasonably be done to make this process more robust.  
recommendation
3. Professor Partington notes that questions on Analysis I were avoided or poorly answered. The Committee had previously found that this course was not well received by students this year. They expect the situation to improve next year on account of measures already taken.
4. Professor Partington observes that many students in the third class will have great difficulty with Part IB and the Directors of Studies will need to consider carefully what is in the best interests of these weaker candidates. The Teaching Committee agree with this observation (noting, however, that some of these students end up with good degree in mathematics). The Committee *recommend* that this observation is relayed to the annual meeting of Directors of Studies.  
recommendation

### Part IB, External Examiners' reports

1. Both external examiners report that the overall performance of candidates was significantly weaker than last year, even though the questions seemed broadly comparable with last year's. They therefore felt that it was appropriate to vary from the Faculty Board guideline of 30% firsts (23% of the candidates were placed in the first class

this year) and make commensurate variations in other borderlines. The Teaching Committee were not persuaded that this action was merited, because: (i) it seems unlikely on statistical grounds that the students in this year should be so much less able than those of other years; (ii) the same cohort obtained marks in Part IA that were comparable with marks obtained by previous cohorts; and (iii) there is evidence from the e-mail student questionnaire that this year's Part IB students believe that their examination was harder than the 1998 IB examination.

recommendation The Committee *recommend* that the examiners for Part IB in 2000 be asked to bear in mind the students' comments that the 1999 papers were harder than usual.

recommendation Part II examiners use the performance of students in Part IB as one factor in determining the relative number of firsts in Part II(A) and Part II(B). The Committee *recommend* that the Part II examiners for 1999/2000 be asked to bear in mind the implications of the reduced number of firsts awarded this year.

recommendation Professor Riley makes the further point that the Faculty Board guidelines (for percentages in each class) may be incompatible with its verbal criteria. The Teaching Committee noted that this point is explicitly recognised by the Faculty Board; the Board's instruction to examiners is that deviations from the guidelines should be justified carefully in the examiners' report. Prof. Riley feels that the development of qualitative criteria is to be welcomed, though the quantification of the criteria lacked clarity and recommends further consideration of them. The Committee *recommend* that the the Faculty Board consider this matter.

2. Dr Chillingworth notes that there is a long tail of rather weak candidates, 'many of whom would probably have failed at other universities offering a high quality mathematics degree'. It is clear from what follows in his report that he does not mean that the individuals would have failed had they attended a different university; he means that candidates at other universities with as few marks, relative to the 'good' candidates, would have failed. The Teaching Committee note that Dr Chillingworth's 'standard pattern' of a candidate with a bottom 3 obtaining half the marks of a candidate with a borderline 1/2(i) may be standard for a modular system, but cannot easily be extrapolated to the system we operate. The experience at Cambridge is that most students towards the lower end of the merit list in Part IB go on to Part II Mathematics and end up with a sound degree (and good jobs).

recommendation Nevertheless, the Committee are concerned that the tail does seem longer this year than is usual. The Committee noted that the average mark for the 'short' questions was lower this year than last, and lower than in Part IA both this year and last, and believes that the short questions may have been less accessible to the weaker students this year than in other years. Accordingly, they *recommend* that next year's examiners pay particular attention to the Faculty Board's guidelines for setting 'short questions'. The Committee does not believe that introducing resits as a possible means of raising the standard of this 'lower end' would be effective.

3. Dr Chillingworth suggests that it would be useful to provide, on the day before the final meeting, (i) examination statistics and examiners' reports on the candidates' response to questions; and (ii) a complete set of examination papers for the current and previous two years. The Teaching Committee *recommend* that the Faculty Board consider the feasibility of these suggestions, which (the former in particular) might be useful to the External Examiners in considering borderline candidates.
4. Dr Chillingworth suggests that a distinction be made on the computer printout between alphas gained on 'short' questions and double alphas gained on 'long' questions. The Teaching Committee agree that this information could be useful to examiners, and *recommend* that the form of the printout be suitably amended for 2000.
5. Dr Chillingworth requests that scripts are sorted by merit order rather than candidate number. Professor Cremona (Part II) suggests that the borderline scripts are extracted in advance. This matter was discussed by the Faculty Board last year, and it was felt that the huge administrative effort was not feasible in the time available. No other external examiners have made this suggestion this year, and Professor Partington (Part IA) commented that it was easy to find the borderline scripts.
6. Dr Chillingworth and Professor Riley make a number of points about the transparency of marking. The Teaching Committee believe that the Faculty Board's code of practice covers these points and *recommend* that the Faculty Board continue to emphasise the importance of rigorous adherence to this code. In addition, the Teaching Committee *recommend* that the code includes the statement 'External Examiners find very helpful brief comments to explain where marks are lost'.
7. Dr Chillingworth regrets that under the Cambridge system the examiners cannot take account of illness or stress in classing the candidates. This part of the examination system is regulated by the Ordinances. The University Board of Examinations state that it is 'fundamental to the University policy on Quality Assurance'. Under this system, the Examiners classify candidates on the basis of their written work only, and there are alternative methods of dealing with candidates suffering from illness and stress. the Teaching Committee is of the opinion that the existing system has considerable merit.
8. Both Dr Chillingworth and Professor Riley comment on the procedures for dealing with cheating in the Computational Projects, though neither is unhappy about the eventual outcome in the case of the one Part IB candidate who was suspected of cheating. A case of cheating was also discussed at Part II, and the outcome was again found satisfactory.

The Teaching Committee note that the Faculty Board is already in the process of dealing with this matter.

- recommendation
9. Dr Chillingworth comments on the lack of continuity of examiners, suggesting fuller involvement of administrative staff in the running of meetings. Dr Cremona (Part II) makes a similar point, suggesting that the burden on Chairmen be reduced so that they could serve for more than one year, possibly by the appointment of an examinations officer. The Teaching Committee *recommend* that the Faculty Board consider the suggestion.
  10. Professor Riley suggests that it would be prudent to undertake an analysis of students' performance on examination questions to check that all material and prerequisites are being delivered as anticipated. The Teaching Committee thought that this would be rather difficult to do. They do use examination statistics as well as student questionnaires to investigate such matters in cases where the need is clear and will consider the specific case (separation of variables).

## Part II, External Examiners' reports

1. Professor Priest and Professor Cremona raise the issue of compulsory computer projects (though Professor Cremona recognises that the present system is consistent with the 'Cambridge tradition'). This matter was discussed last year by the (previous) Teaching Committee, which recommended strongly that the present system is retained. The marks for the Computational Projects are currently 'extra', in the sense that a candidate who does not take the Projects cannot gain these marks in any other way; compulsory presumably means that such a candidate would automatically fail. The Faculty Board felt (last year) that this would give the Computational Projects a weight incommensurate with that of the other courses. (See also the Teaching Committee's report on the 1998 examinations.)

The following paragraph in Professor Priest's report, written in support of his suggestion of compulsory Projects, is based on several misunderstandings: the Computational Projects are not meant to be the same standard as the other *papers* (they are equivalent in credit to a 24-hour lecture *course*); and the conversion  $0.37 \text{ ALPHAS} = 0.74 \text{ alphas}$  on Paper 4 is not correct ( $1 \text{ ALPHA} = 3 \text{ alphas}$ ). Professor Priest's next paragraph (written partly in support of the suggestion of compulsory Projects) states that candidates at a borderline who had not done the Computational Projects were promoted because their quality on Papers 1–4 was higher than those who had done the Computational Projects. If this were true, it would be in breach of the Faculty Board guidelines. The Teaching Committee consulted the Chairman of the Examiners and two other examiners and ascertained that no candidates were promoted on this basis.

2. Professor Priest is uncertain about the aim of Part II(A) (in particular, whether it is meant to be an easier course) and thinks that the students may also be. The Teaching Committee could find no evidence for this. There are Faculty Board guidelines

to the effect that only students doing well in Part IB should take Part II(B) and that the classification of the two Alternatives should be consistent. The message to students and Directors of Studies is clear and well understood (the lecture courses for Alternative A may be easier, and the format of the examination certainly suits weaker candidates, but it is not easier to get a first in Alternative A than in Alternative B.)

Professor Priest comments that the questions on Joint Courses appear comparable in standard to those on B courses and harder than those on A courses. The Teaching Committee found this difficult to assess, but agree with Professor Priest that it is an important issue: they *recommend* that in future the Faculty Board give clear guidance to examiners on this matter.

recommendation

3. Professor Priest comments on the ‘naive and crude code’ used to encrypt candidates’ numbers, stating that it is amateurish and trivial to break and should be replaced by a random-number code. This seems to be a misunderstanding: the Teaching Committee ascertained from Mr Dixon at the Board of Examinations that a random-number code is used to encrypt the candidate numbers.

4. Professor Priest asks if ‘more could be done to to reduce the number who gain III, Ordinary or Fail on IIA’. He continues ‘Can you can compile reports and recommendations from tutors on those who who did so this year as to the causes of their poor performance and possible ways in which in retrospect they may have been avoided?’ Out of 107 candidates in Part II(A) (and 88 in Part II(B)), six were place in the third class, three were granted and allowance towards an Ordinary BA and one candidates failed. The Teaching Committee were doubtful that anything would be achieved by this, given the considerable efforts that Colleges already lavish on such students to prevent low achievement. Nevertheless, the Committee *recommend* that the suggestion be referred to the Director of Studies meeting.

recommendation

5. Professor Priest and Professor Bingham both suggest that the structure of the Part II examination be considered with a view to moving towards a modular scheme (in which each course has a separate examination paper). The Teaching Committee considered this very point two years ago (Professor Bingham’s gentle ribbing is thus not appropriate, in this case!) and concluded that a modular scheme would not solve the problem that was then under discussion (how to examine the Joint Courses) and would have many undesirable effects. It is true that modular schemes have become more common at other universities, but to some extent such schemes were forced on mathematics departments by Joint Honours and elective course programmes.

Professor Priest asks about the pros and cons of our non-modular system. The Teaching Committee discussed this (continuing the discussion of two years ago). The disadvantage mentioned by External Examiners is that it is difficult to compare (and rescale, if necessary) the marks from different lecture courses. The Committee believe that ideally the examination questions and courses should be of the same

recommendation

level of difficulty and therefore no scaling would be necessary; that is what we strive for in our lengthy examining procedure, in which a small body of examiners takes collective responsibility for all the questions. The Committee noted that considerable efforts have recently been made by the Faculty Board to develop guidelines to help examiners compare the level of difficulty of ‘short’ questions<sup>1</sup> and *recommend* (i) that these guidelines be circulated to examiners this year and (ii) that guidelines for ‘long’ questions be developed as a matter of urgency.

They also noted that scaling has its own difficulties: there is good evidence that some courses are taken only by the most able students; each student tends to concentrate on one of three areas, so comparison across these areas is difficult; no amount of scaling can compensate for an examination that is much too easy or much too difficult. The Committee also noted that the significant element of choice of questions for each student in each of our papers means that an anomalously hard question can be avoided.

The main advantage of our system lies in its flexibility and the fact that this is managed without an excessive burden on either students or staff. The flexibility allows courses of different lengths (24, 16 or 12 lectures) and allows students to take any combination of courses or even parts of courses.

recommendation

The Teaching Committee noted that Professor Priest refers to the current Tripos as a superb system and that Professor Bingham is not unhappy with it. The Committee do not believe that advantages of a change to a modular scheme outweigh the disadvantages, and therefore does not believe that there is a good case for changing. However, the Committee agree that it would be sensible to consider the matter again from time to time, and *recommend* that the Faculty Board marks this down for future discussion.

recommendation

6. Professor Bingham comments on ‘differential scaling’ between Part II(A) and Part II(B), meaning that the borderlines are set at different mark levels despite the existence of common courses. This scheme was discussed at extraordinary length in the year before it was adopted, by the Teaching Committee, the Staff Meetings and the Faculty Board. The Teaching Committee do not believe that there is any unfairness between the two Alternatives (and Professor Bingham does not claim that there is). The Committee agree with Professor Bingham that the system appears complicated, but It does not wish to suggest any changes in this first year of operation of the new scheme. The Committee *recommend* that this point be included in the future discussion recommended above.

recommendation

7. Professor Cremona endorses the proposal in the Examiners’ report to use a standard template for the model solutions; the Teaching Committee *recommend* that this be

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<sup>1</sup>A short question should be accessible to any student who has studied the material conscientiously. It should not contain any significant problem element. It should take the examiner about 10 minutes to write a full solution.

adopted for all parts of the Tripos.

8. Professor Bingham suggests that statistics might be kept on the average marks and number of attempts on each question. Such statistics are kept, and made widely available (they are circulated to all Directors of Studies and scrutinised by the Teaching Committee and Faculty Board).