Final Honour School of Mathematics and Statistics

Trinity Term 2007

Guidance notes for 4th year dissertations in Statistics for the academic year 2007/2008

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1 Introduction

In the 4th year (Part C) of the MMath in Mathematics and Statistics, students are expected to take the equivalent of three M-level 32-hour lecture units. **One of these units must be a statistics dissertation.** This can take the form of a data analysis or simulation project or a theoretical project in probability, statistics or operations research.

Approval and allocation of statistics dissertations is the responsibility of the Statistics Projects Committee. Third year projects (Extended Essays) in all Honour Schools and dissertations for 4th year students in Honour Schools other than the FHS in Mathematics and Statistics remain the responsibility of the Mathematics Projects Committee, even if the project has a statistical component and/or the supervisor is a member of the Department of Statistics.

Applications for approval of a project should be made on the standard application form. This form also contains a list of projects for students to rank in the order of their preferences. Note these key points:

- The deadline for submission of the standard form (expression of preferences) is Friday of week 9, Trinity Term.
- The deadline for submission of the form for approval of personalised projects is Monday of week 6, Trinity Term.
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- A selection of project suggestions is compiled and made available at http://www.stats.ox.ac.uk/current_students/bammath/projects
- Students are encouraged to approach potential supervisors, either personally or through their college tutor.
- Further advice, e.g. for candidates who wish to propose a project but need help finding a supervisor, can be sought from the members of the Statistics Projects Committee, by email at 4yr-projects@stats.ox.ac.uk.
- After the week 9 deadline, the Projects Committee will aim to allocate projects to students and let students know the outcome in order to allow students to get some preliminary work on the project done in the long break between Trinity and Michaelmas Term.

2 The amount of work involved

A project is of one unit weight, and should therefore be equivalent to two sixteen-hour lecture courses. Accordingly a student might think of the project as being the equivalent of two-thirds of a term's work. If some preparation has been done in the Summer Vacation, it should occupy between a quarter and one-third of his or her working time during Michaelmas Term, the Christmas Vacation and Hilary Term. Students should expect to have around 8 meetings with their supervisor across Michaelmas and Hilary terms. Supervisors are only expected to read the draft dissertation once.

There is always a risk that a project might not succeed, especially if the original plan had involved some original research. Although this is a rare occurrence, examiners are aware of the possibility. They accept that a well-written account of the work done, with an explanation of why the original aims were not met, can nevertheless be worthy of high credit.

3 Choice of subject

The dissertation can take the form of a data analysis or simulation project, or indeed a theoretical project in probability, statistics or operations research. Furthermore, it is important that it gives the student an opportunity to present his or her own work. It is understood that only in exceptional cases will this include original research. Sometimes it will be an analysis of a fresh dataset using a range of methods, some of which are new to the student. Sometimes it will be a matter of organising, presenting, or completing material culled (and understood) from advanced textbooks, monographs or journals.

A list of projects is made available via
http://www.stats.ox.ac.uk/current_students/bammath/projects

For some ideas, see also the Probability and Statistics section of the suggestions on the project page on the Mathematical Institute website
http://www.maths.ox.ac.uk/current-students/undergraduates/projects/html/project-ideas/node9.html

There are also some probability and operations research projects in the project archive of the London Mathematical Society
http://www.maths.abdn.ac.uk/maths/department/services/lms/projread.html

4 Supervisors

Information on teaching and research interests of academic staff as well as contact details can be found at http://www.stats.ox.ac.uk/people/academic_staff

A student who has an idea for a project but, also in consultation with his or her tutor, is unable to come up with names of potential supervisors may have chosen an inappropriate subject. Members of the Project Committee are available to try to resolve the issue of finding a potential supervisor. They can be contacted collectively at 4yr-projects@stats.ox.ac.uk.

5 The formalities

Students who have ideas about projects they wish to present should seek guidance from their tutors. Members of the Statistics Projects Committee will also be very happy to help focus a project and find a supervisor. The present Committee is:
Dr M Winkel (Chairman), Professor G Reinert, Dr G Nicholls.

They can be contacted by email at 4yr-projects@stats.ox.ac.uk.

Students wishing to propose a personalised project should submit the form for Approval of a Personalised Project by Monday of week 6. This can be found at http://www.stats.ox.ac.uk/current_students/bammath/projects . Here a student and supervisor work out (and both sign) a proposal **distinctly different** from the list of projects provided by the Department. The student is then guaranteed this project, unless the project panel has serious doubts that the project can succeed at an adequate level. Students who wish to take this opportunity should contact potential supervisors in good time. Students and supervisors may seek advice on personalised projects from the project panel at 4yr-projects@stats.ox.ac.uk.

A personalised project proposal should be at least 100 words and should be sufficiently detailed for the members of the committee to judge whether the project is of appropriate depth and whether it is possible to find a suitable assessor in the University. If possible, candidates should include details of the main reference(s) - books, papers, etc.

The Project Ranking form contains a list of project titles which have been worked out into full proposals by supervisors. Students must rank the projects on the list by order of preference (1=highest preference), for which they fulfil the prerequisites, and state which prerequisites they fail to fulfil for unranked projects. Failure to do so may reduce a student's chances of being allocated one of his or her preferred projects, for fairness reasons – there may well be competition for their first choices. Descriptions of listed projects are available from http://www.stats.ox.ac.uk/current_students/bammath/projects in varying amounts of detail. Students are encouraged to contact supervisors of listed projects to find out more about these projects. Also students who applied for approval of a personalised project should completed this form, in case the project panel has serious doubts that the personalised project proposed can succeed. Failure to do so may result in a student's preferred listed projects being allocated before he or she has expressed preferences. No second round of personalised proposals is being planned.

The appropriate sections of the form should be checked and signed. [This is to ensure that students have included all the information required by the examiners.]

Allocation is made at the end of Trinity Term in order to ensure that all 4th year students in the Final Honour School of Mathematics and Statistics have a project by the beginning of their 4th year. Joint School students do not have an opportunity to do more coursework to replace a rejected project proposal. It is therefore essential to ensure that students have an agreed project before the summer vacation.

6 Presentation

The examiners give credit for qualities such as content, accuracy, organisation, clarity and style. A dissertation should be self-contained except insofar as it cites material from Mods, Part A and Part B, and standard works or journals. Proper credit must be given to sources. The dissertation must be typed, and students are advised to consider well the benefits of computer-based facilities. These allow steady accumulation of material and effective editing. Moreover, although some word-processing and type-setting systems are very poor for mathematical work (and these are to be avoided), others, such as dialects of TEX, can offer the possibility of very well-presented output. Computing facilities can be made available in the Department of Statistics.

The dissertation should be bound. Hard bindings are not required and cheaper forms of soft binding, such as thermal binding or comb binding, are in most cases perfectly adequate. Loose leaves in ring binders or held together by paper clips, are not acceptable.

7 Submission of dissertation

Two copies of the dissertation, identified by the candidate's examination number only, must be sent to the Chairman of the Examiners, Honour School of Mathematics and Statistics, Examination Schools, Oxford, to arrive not later than **noon on the Friday of the first week following the end of the Hilary Full Term preceding the examination**.

Every candidate must complete and sign the declaration of authorship, available on the Statistics website, to the effect that the dissertation is their own work, except where acknowledgement is made. The declaration should be placed in a sealed envelope bearing the candidate's examination number and submitted together with the dissertation.

8 Marking

Dissertations will be assigned USMs according to the same principles as Mathematics/ Statistics exam papers. In arriving at these marks, the relative weights for theoretical dissertations given to content, presentation and mathematics/statistics will be 25%, 25% and 50%, respectively. For dissertations on data analyses, simulations or similar topics, the examiners will assign 25% for content, 25% for presentation and 50% for the quality and appropriateness of the data analysis/simulation (see 9.2 for further details).

9 Regulations

9.1 Regulations governing dissertations

(1) *Subject, authorship, and format*
The subject of the dissertation shall be a project which shall be supervised by a member of the Faculty of Statistics or, in exceptional circumstances, by some other person of equivalent seniority approved by the Chairman of the Statistics Projects Committee of the Statistics Academic Committee.

The dissertation shall be the candidate's own work; it may, for example, be a computation based on known results or a critical review of publications in probability, statistics or operations research, or a data analysis or simulation project. The supervisor may discuss with the candidate the field of study, recommend references, and discuss what methods are appropriate; the supervisor may also read and comment on a first draft. Every candidate shall sign a declaration of authorship to the effect that the dissertation is their own work, except as permitted by this regulation or where acknowledgement is made, and this declaration shall be placed in a sealed envelope bearing the candidate's examination number and presented together with the dissertation.

The dissertation should be typed, and must be held firmly in a stiff cover. Its length should not exceed the equivalent of 10,000 words (excluding diagrams, tables, references and texts of computer programs). Unnecessarily lengthy projects may be penalised.

(2) *Approval and allocation of topic*
Candidates shall, after consultation with their tutors, submit through their colleges to the Chairman of the Statistics Projects Committee of the Academic Committee of the Department of Statistics,

either (I) the title that they propose together with

- a brief description (of at least 100 words) of the project which will be the subject of the dissertation. This should be sufficiently detailed for the members of the committee to judge whether the project is of appropriate depth and whether it is possible to find a suitable assessor in the University. If possible, candidates should include details of the main references books, papers, etc.;

- a statement of approval from the person who has agreed to act as supervisor (a potential supervisor may be approached either by the candidate or through the candidate's tutor: alternatively, advice may be sought at an earlier stage from the Statistics Projects Committee).

  No dissertation will be accepted if it has already been submitted, wholly or substantially, for a final honour school other than Mathematics or Mathematics and Statistics as specified under Option (I), or for another degree of this University, or for a degree of any other institution.

The application shall be made not earlier than the first day of Trinity Full Term in the year preceding the examination and not later than Monday of the sixth week of the Trinity Full Term in the year preceding the examination. The Statistics Projects Committee of the Department of Statistics will decide as soon as possible, whether or not to approve the proposal and will advise the candidate forthwith.

Candidates whose proposal was not approved by the Statistics Projects Committee must choose an alternative project from a list of suggestions compiled by the Statistics Projects Committee as explained under (II).

or (II) a ranked list of suggestions from a list compiled by the Statistics Projects Committee for which the candidate has the prerequisites required. Candidates who do not provide a list will be given low priority in the allocation of popular projects.

Details of approved projects shall be forwarded by the Chairman of the Committee to the Chairman of the Examiners not later than the first day of the following Hilary Full Term.

(3) *Submission*
Dissertations (two copies), identified by the candidate's examination number only, must be sent to the Chairman of the Examiners, Honour School of Mathematics and Statistics, Examination Schools, Oxford, to arrive not later than **noon on the Friday of the first week following the end of the Hilary Full Term preceding the examination**. At the same time, the supervisor shall submit to the Chairman of the Examiners a confidential report, which includes a record of meetings with the candidate, the purpose of which is to assist the examiners to determine how much assistance the candidate has received in the preparation of the dissertation; this report will be on a form supplied for the purpose by the Chairman of the Examiners. The examiners will

give a dissertation the weight of one Part C unit (out of an expected total of three units of 32 lectures each).

9.2 General Information on Assessment and Marking

In writing a dissertation, you should be aware of how the examiners will assess it and mark it. The most important point is that the project is in probability, statistics or operations research. In fact, marks will be awarded in the following proportions:

Mathematics/Statistics or Data analysis/simulation 50%
Content 25%
Presentation 25%.

Mathematics/Statistics: proofs and assertions should all be correct. In applied topics, the derivation of the model should be properly justified.
Data analysis/simulation: The data analysis has to be correctly and suitably done, including the choice of model. Similar comments apply to simulation.
Content: you must do more than rehash text books and lecture notes, and you should use original sources. The examiners are looking for some of your own thoughts and contributions. In particular you must not plagiarise (see below).
Presentation: the mathematics must be clear and well laid out; formulae must be clearly presented, tables and graphs properly referenced in the text; an abstract and a bibliography must be provided; the English should be clear and grammatically correct. Give some thought to notation, choice of typeface, and numbering of equations and sections. Do not fail to number the pages. Finally, be sure to supply complete and accurate references for all the sources used in completing the project, and be sure to cite them properly in the text. The following note and links give detailed advice on this.

9.3 Plagiarism and the proper acknowledgement of sources

Plagiarism is defined as the presentation of another person's thoughts or words or artefacts or software as though they are your own. The dissertation should be written so as to make clear to what extent any substantial section is derived from another source. Any exact quotation from published or unpublished works must be clearly identified as such by being placed in quotation marks, and students should identify the source as accurately as possible. [This does not apply to definitions of standard mathematical and statistical terms which are common knowledge amongst mathematicians/statisticians.] Equally, if a student summarises another person's (including the supervisor's) ideas, judgements, figures, software or diagrams, a reference to that person or the source should be made in the text and the source should be included in the bibliography. This includes material published on a web site.

Section 9.5 of The University booklet entitled Proctors' and Assessor's Memorandum, which all students should have and which is available on the web and from the Proctors' Office in the University Offices, Wellington Square, contains guidance. In particular, the following is one of the Proctors' regulations for University Examinations:

> *5. In any written work (whether thesis, dissertation, essay, coursework, or written examinations) passages quoted or closely paraphrased from another person's work must be identified as quotations or paraphrases, and the source of the quoted or paraphrased material must be clearly acknowledged.*

That section also contains the following advice:

> *The University employs a series of sophisticated software applications to detect plagiarism in submitted examination work, both in terms of copying and collusion. It regularly monitors on-line essay banks, essay-writing services, and other potential sources of material. It reserves the right to check samples of submitted essays for plagiarism. Although the University strongly encourages the use of electronic resources by students in their academic work, any attempt to draw on third-party material without proper attribution may well attract severe disciplinary sanctions.*

Students may also ask their supervisors to recommend mathematical papers which illustrate good practice in citing sources. The book A Primer of Mathematical Writing by Steven G. Krantz, published by the American Mathematical Society (1991) is commended, as is the older How to write Mathematics by N. E. Steenrod, P. R. Halmos, M. M. Schiffer and J. Dieudonné, American Mathematical Society (1973).

The London Mathematical Society website has useful pages on Mathematical writing and references: http://www.lms.ac.uk/publications/documents/writing.pdf and http://www.lms.ac.uk/publications/documents/references.pdf and cites several other useful texts on writing mathematics.

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