Intended learning outcomes and the marking rubric for MSc dissertations in the Department of Mathematics , academic year 2020-21

This document contains the intended learning outcomes and marking rubric for MSc student dissertations conducted in the Department of Mathematics. It applies to dissertation to be completed over the summer in 2019, following the semester two examinations .

The marking rubric provides a guide for examiners to follow when they are marking dissertations and is also intended to be informative to students on what the criteria are that need to be fulfilled in order to achieve a mark at a given level.

Intended learning outcomes for MSc dissertations are:

1. summarise and select appropriate mathematical content to defend arguments made;
2. present mathematical content in such a way as to communicate key ideas in written (and, for undergraduate, verbal) form;
3. accurately describe specific mathematical concepts;
4. write aims and objectives of the project and abstract content;
5. discuss mathematical arguments on specific topic and illustrate place in wider subject area, in written (and, for undergraduate verbal) forms.

These intended learning outcomes align to the five assessment criteria described in the rubric below (introduction, presentation, accuracy, content and understanding). Half the marks are allocated for communication of ideas (introduction, 10 marks; presentation, 20 marks and accuracy of argument, 20 marks) while the other half are awarded for comprehension (choice of content, 25 marks and understanding of material, 25 marks). There is no oral examination component and so marks are entirely based on the written dissertation.

The five assessment criteria are each graded at five levels (or mark ranges) for which descriptors are provided in the rubric as to what might be expected to be seen in a dissertation for it to achieve a mark for each criterion at a given level. These descriptors are aimed to be representative for typical Mathematics dissertations but, given the large range of potential project topics across the Department's MSc programmes, the rubric cannot be overly prescriptive. The actual grade levels correspond to unsatisfactory (fail) , insufficient contribution for pass (fail), average contribution (pass), good

contribution (merit) and very good contribution (distinction). Marks which can be awarded at each level correspond to one or more integers and these are indicated on the rubric.

Not all the elements mentioned in the description for a grade level are absolutely necessary for a mark to be awarded in that range; rather the descriptors contain information to provide a guideline for examiners when awarding their marks and so support their decision making. They help in trying to provide a level of consistency to the dissertation marking process across the Department. Examiners are also expected to provide additional written comments in their report on a dissertation about how they arrived at a particular mark for each criterion.

After a dissertation has been marked independently by the two examiners, they will have a meeting to discuss and agree a final joint mark.

Copies of some of the dissertations, along with the examiner report forms, are sent to the External Examiner(s) for each of the MSc programmes so that they can look at examples of projects marked at different levels and thus see our standards and be aware of how the dissertation assessment process has worked in practice. They will provide the Department with feedback on this.

Marking rubric for Department of Mathematics MSc dissertations, 2019-20

MSc rubric	**Unsatisfactory**	**Insufficient contribution for pass**	**Average contribution**	**Good contribution**	**Very good contribution**
Abstract and Introduction (10 marks) Abstract. Statement of project's aims (what they will do) and objectives (how they will do it). Overview of the underlying problem and of what the dissertation accomplishes/reason for project. Contribution of student to field stated. Maps to ILO 4	**0, 1, 2, 3** No indication of what the project aims and objectives are. Abstract and introduction not present, lack essential information, or not relevant.	**4** Project aims and objectives lack clarity. Little indication of what the dissertation is aiming to accomplish. Abstract present, but a poor or inaccurate summary of dissertation.	**5** Aims and objectives of the project are clear. Introduction and abstract informative.	**6** Clear statement of project aims and objectives and set in wider context. Clear explanation of the underlying problem. Clear indication of contribution made by student. Abstract a good summary of work presented.	**7, 8, 9, 10** Insightful explanation of problem and very clear aims and objectives of project. Underlying problem very clearly explained. Abstract is a clear and succinct summary of dissertation.
Presentation (20 marks) Organisation and ordering of material; detailed bibliography. Clarity of writing; clarity of graphs, diagrams and tables and code (if applicable); consistent notation; formatting and accuracy of bibliography *(note that use of citations should be marked in content/understanding).* Maps to ILO 2	**0 to 7** Little or no attempt at organising the material. Unclear writing. Poor presentation that seriously hampers the understanding of the report.	**8, 9** Organisation weak, but with plausible structure. Problems with presentation affecting readability. Diagrams and tables unclear. Bibliography lacks detail. Poor internal cross referencing	**10, 11** Sound writing and presentation of material in general. Tables and figures are present but without detail or legends. Cross referencing consistent.	**12, 13** Clear presentation and structure. Good elegant figures and graphs. Complete bibliography with good internal referencing.	**14 or more** Very clear presentation and command of language. Original and innovative ways of visualising and presenting results. Accurate and well formatted bibliography.
Accuracy (20 marks) Correctness of arguments; mathematical precision; correctness of computer code and analysis of outcomes (if applicable) Maps to ILO 3	**0 to 7** Incorrect or weak mathematical arguments. Non-reproducible code (if applicable).	**8, 9** Mathematical arguments are sometimes correct, but lack precision and clarity. Ambiguity in the interpretation of results (if applicable).	**10 to 11** Results appear correct and the mathematics is accurately reproduced. Level of detail in proofs and derivation variable.	**12 to 13** Correct results and interpretation. Mathematical arguments show logical thinking and have sufficient detail.	**14 or more** Correct results and interpretation. Mathematical arguments are detailed and show good logical construction.

Content (25 marks) Selection of material; quality and quantity of material given the time-scale; evidence of individual expression; appropriate use and description of methodology; appropriate use of sources; appropriate description of background material/citations Maps to ILO 1	**0 to 9** Insufficient quantity and quality of material. Inadequate use of sources. No or little description of related literature.	**10, 11, 12** Fair selection of material, but the overall quality and quantity of the work is still lacking. Sketchy and incomplete explanations of used methods. Incomplete use of citations.	**13, 14** Sound selection of material and use of sources. Is able to reproduce standard results applicable to the particular project.	**15, 16, 17** Good and well-rounded selection of material. Challenging topic. Is able to reproduce results through independent work.	**18 or more** Has extended results beyond expectation for particular project. A large amount of independent work has been carried out.
Understanding (25 marks) Appreciation of meaning, context (did they justify inclusion of citations) and significance of work presented; independent thinking; soundness of conclusions reached; understanding of methods used. Maps to ILO 5	**0 to 9** Little sign of understanding of topic. Insufficient appreciation of context and importance of work. Little understanding of methods used.	**10, 11, 12** Insufficient understanding of main concepts and some of the methods. Some comprehension of wider context is evident though.	**13, 14** Good understanding of material. Some evidence of independent thinking and judgement is there, but could be improved.	**15, 16, 17** Independent interpretation or appraisal of the results and material in the project.	**18 or more** Is able to interpret and critically appraise the results and materials of the project in a wider context.