

The Education Committee of the London Mathematical Society (LMS) welcomes the opportunity to respond to the Consultation by QAA on the proposed new Subject Benchmark Statements for Mathematics, Statistics and Operational Research (MSOR) in September 2022. The members of the committee are involved in a wide range of activities from supporting mathematical education in schools, colleges, and universities at both undergraduate and postgraduate levels, to encouraging the public and young people to appreciate and engage with mathematics. The remit of the committee is to ensure that the views of the LMS on mathematical educational issues are made known to decision makers and works to promote the public image of mathematics.

The Education Committee of LMS supports the revised MSOR Subject Benchmark Statements (SBSs). We particularly welcome the clear statement indicating that the SBSs are not to be regarded as a set of statements that define a prescribed National Curriculum for HE, instead promoting the use of these statements to guide for understanding the learning outcomes associated with various academic and vocational courses. The SBSs have been updated to reflect better the overlapping nature of the M, S and OR subjects, and treat them as one discipline, making it easier for providers of various courses to engage with these statements. The 2022 SBSs reflect better (than the 2019 SBSs) the skills and the fundamental problem-based nature of the subject and we welcome this. The SBSs are appropriately formulated, without being over-prescriptive, allowing thus for diversity of course design and approaches to teaching and learning employed by providers, while maintaining the academic standards of graduates in MSOR.

We welcome the broadening of the SBSs to include the introduction of Education for Sustainable Development, Enterprise and Entrepreneurship, Accessibility and Equality, Diversity and Inclusion themes. These sections are quite detailed and it should be clarified that their intention is to provide helpful guidance to providers to understand what these new initiatives could mean for MSOR and to give a non-exhaustive list of examples as to how the themes could be embedded within curricula. If so, this goes some way towards justifying both the rather long document in comparison to the previous 2019 version and some of the other new benchmark statements. In some places the guidance could be interpreted as requiring specific non-mathematical content to be included in programmes and we would like the Panel to reconsider the first part of the phrase "Students should be educated in general EDI matters and also those that are specifically relevant to MSOR, such as the need to consider diversity in data collection and analysis.", which could be construed as a prescriptive requirement to include a non-maths EDI module compulsory for all.

The references to specific issues such as Nazism and decolonisation in the guidance are noted as standing out from the other new benchmark statements, which are less explicit in tone. The Panel could consider revising the guidance section to streamline it and indicate clear priorities.

We commend the work of the panel and in the following we are responding to the specific questions in the consultation survey.



Consultation on revised Subject Benchmark Statements: Online survey questions

QAA is formally consulting on new versions of 12 Subject Benchmark Statements that have recently been reviewed by advisory groups drawn from the higher education sector, subject associations, PSRBs and employer representatives.

This consultation will close at **Wednesday 2 November 2022 at 6pm**. QAA, in coordination with the advisory groups, will consider the responses and publish the revised Statements in Spring 2023.

This document details the questions being asked in the online consultation survey and is intended to help you prepare your answers. **However, responses must be submitted via the online survey for the relevant Statement.**

[Consultation documents and links to the online survey](#) for each Statement are available on the QAA website.

Information about you

Q1 Your name: *Cosette Crisan, Paul Glaister, Tom Roper*

Q2 Your provider/organisation: *LMS Education Committee*

Q2a Are you responding to the consultation as:

- an individual
- on behalf of your provider/organisation

Q3 Which of the following best describes your role?

- Student/prospective student
- Student/course representative/elected officer
- Students' union or other representative body staff
- Graduate
- Higher education staff (non-academic)
- Higher education staff (academic)
- Higher education staff (quality)
- Higher education sector body
- PSRB
- Employer
- Other (please specify)

Q4 Email address if happy to discuss response further:

About the Subject Benchmark Statement

Question 5

Overall, does the revised Subject Benchmark Statement continue to define the nature of the subject area and the academic standards expected of graduates?

Yes

No

Comments:

- (a) The treatment of mathematics, statistics and operational research as one discipline, under the MSOR umbrella is particularly welcome, and an improvement on the 2019 SBSs, where the subjects were unhelpfully treated separately.
- (b) The unified treatment of MSOR supports a more meaningful engagement with the 'single' 2022 subject benchmark statements.
- (c) Benchmark statements at above threshold levels are briefly described (in **Academic standards** section, para 4.5). Providers might benefit from a description of the other higher levels of attainment at undergraduate level (i.e. what is above 'threshold'-Good?, Excellent?). In the same **Academic standards** section, could the choice of words be improved in order to convey better the above standard level of skill in calculation and manipulation, as currently the 'a good level of skill...' (para 4.5) and 'a reasonable level of skill...' (para 4.6) is 'escalated' to 'the *facility* with which the student performs calculations or manipulations'.

Question 6

Does the information in the introductory sections successfully describe the context, characteristics and purpose of the subject?

Yes

No

Comments:

- (a) We very much welcome the strong references to data and data science, and particularly the acknowledgement of, and reference to 'interdisciplinary programmes in data science, exploiting this commonality to assemble a coherent educational provision that draws together elements of mathematics, statistics, operational research and other disciplines in order to address particular problems.' However, we would ask/suggest that in addition to this, other examples of application areas that are significant and of importance are also cited.
- (b) Studying the discipline for its own sake, and as a driver and an intellectual endeavour without necessarily immediate real-world applications (para 1.11) is a much welcome improvement on the 2019 SBSs.
- (c) Para 1.17 (apart from the use of word 'strict' here and elsewhere in the document – can this be removed or replaced?) Could this paragraph be re-formulated for a clearer meaning – single-honours and joint-honours are independent paths, so the 'materials' won't be repeated for the students.
- (d) Regarding the EDI statements included in the revised 2022 SBSs - Have these statements been drawn up as a result of a wider discussion beyond the MSOR SBS Panel?

- (e) Para 1.3 makes references to 'specialist technology for MSOR' as a medium for delivering the teaching or managing learning, but not as a tool to facilitate and support the learning and understanding of mathematics concepts as such. Although this is attempted in section 3, in para 3.8 of sub-section 'Teaching and Learning', it should also be part of the introductory section, highlighting the important role digital technology has in supporting understanding and exploring mathematics in ways enabled by the visualising and dynamic facilities of digital technology.

Question 7

Does the section on benchmark standards adequately cover the skills expected of a graduate in the subject area?

Yes

No

Comments: Generally Yes

- (a) The explicit statements about the importance of graduates' development of transferable skills and awareness of standards needed to use MSOR in a diverse array of professional settings is welcome.
- (b) The statements of the 'subject specific' MSOR skills as opposed to a limiting and not always helpful differentiation between skills of each sub-fields (Maths, Stats and OR) is an improvement on 2019 SBSs.
- (c) In paragraph 4.9, the importance of development of skills to select and employ appropriate digital tools to support mathematical thinking and reasoning is missing (which relates to Q6 comment g).
- (d) We agree with those statements that make specific reference to students' development of their skills in computational thinking as part of MSOR education.

Question 8

Do the sections on learning and teaching, content and assessment provide an appropriate indication of these aspects of the subject area?

Yes

No

Comments:

- (a) We agree with the suggestion that providers make an informed choice of approaches to teaching, learning and assessment from the wide range of available pedagogies. We also agree with the inclusion of statement 3.37 referring to the 'considerable board space' required especially when board teaching approach is used, but also needed if digital tools were to be used to support and complement written board work.
- (b) We welcome para 3.38 which promotes the use of digital tools to allow students to explore MSOR concepts in depth. However, successful integration of such tools depends on resources and the tutors' familiarity with and knowledge of such tools and modelling their use in the teaching. As such, we welcome the recommendation in 3.42 for all MSOR staff to engage in continuing professional development throughout their career.

- (c) We also welcome the recognition of the contribution of PGTAs to the teaching and learning of MSOR, and of their professional development needs, and a view that such needs are subject-specific/discipline-related, as opposed to the generic approach usually adopted by most HEs.
- (d) The document recognizes the need for a variety of assessment methods to reflect the variety of MSOR skills. While 'summative assessment' is explicitly referred to, references to 'formative assessment' which has the most impact on students' learning are missing from this document (para 3.46 seems to make such implicit references, but instead 'informal feedback' terminology is used).
- (e) The assessment should be linked to all aspects of the course outcomes. In para 3.45 for example, the wording could be changed to 'Assessment could also establish...', to indicate (more strongly) that there will be opportunities to develop general skills in the course and these will be assessed.
- (f) Paragraphs 1.6 and also 3.52 capture well (in a more concise format than 2019 SBSs 4.15-4.16 statements) the overall performance of a student against the learning outcomes of the MSOR programmes.
- (g) To support the national maths teacher shortage crisis, there are opportunities in the 'Related Areas' section to add a paragraph about the availability of optional mathematics education modules aimed at students who are curious about how mathematics is learned and what educational environments support learning and participation, with a view of encouraging and motivating MSOR students to consider teaching mathematics as a career. The disciplines won't survive if we don't have well-qualified MSOR graduates having a career in teaching for the next generation of students and of course all other citizens who will benefit society and the economy in general.

Question 9

Do the sections on Education for Sustainable Development, Enterprise and Entrepreneurship, Accessibility and Equality, Diversity and Inclusion clearly express the needs of the subject and students in relation to these areas?

Yes

No

Comments:

- (a) We welcome the inclusion of the Equality, Diversity and Inclusion theme. As noted above, however, we would urge caution in wording that implies a prescriptive requirement to include a non-maths EDI module compulsory for all.
- (b) The ESD section is well written, with references and examples to support providers understand what it could mean for MSOR. We welcome para 4.8 which acknowledges that ESD is an emerging field within MSOR, and key to the success of this new initiative is that 'providers are encouraged to innovate and evaluate pedagogical developments in this area'. We welcome the recognition of the need of much better support, guidance, materials, resource, and time made available, to enable all colleagues in MSOR HEI settings contributing to programmes to realise this as fully as possible.

Questions 10-13 N/A

Some consultations include subject-specific questions here. Please check the relevant survey for the Subject Benchmark Statement you are responding to if you wish to draft your consultation response here.

Biomedical Science and Biomedical Sciences	Does the revised Subject Benchmark Statement adequately cover the scope and emerging topics in the subject?
	Would you or your organisation use the additional information in this Subject Benchmark Statement on Education for Sustainable Development, Enterprise and Entrepreneurship, Accessibility and Equality, Diversity and Inclusion, and if so, how?
	Is the distinction between Biomedical Science and Biomedical Sciences clear in this Subject Benchmark Statement?
Biosciences	Does the revised Subject Benchmark Statement adequately cover the scope and emerging topics in the subject?
	Would you or your organisation use the additional information in this Subject Benchmark Statement on Education for Sustainable Development, Enterprise and Entrepreneurship, Accessibility and Equality, Diversity and Inclusion, and if so, how?
Engineering	In section 1, Safety and Security topics have been grouped; do you support this alignment?
	In section 1, Industry and Entrepreneurship have been grouped; do you support this alignment/grouping/structure?
	Is there sufficient emphasis on Equality Diversity and Inclusion throughout the document? Is more detail required and if so where?
	Is there sufficient emphasis on Ethics and Inclusion throughout the document? Is more detail required and if so where?
Languages, Cultures and Societies	Do the various sections adequately cover all sub-areas of Languages, Cultures and Societies?
	Is the use of C1 as the threshold level for language proficiency in the Benchmark Standards section still appropriate for the majority of LCS graduates?
Law	Has the SBS appropriately balanced professional and academic needs?
	Has the SBS appropriately balanced and reflected the needs of the four nations of the United Kingdom?
	Does the SBS sufficiently reflect the teaching qualification and standards expectations for those delivering legal education?
Politics and International Relations	Is the coverage of both Politics and International Relations in the statement appropriate and balanced?

Final question

Please use this space to add any further observations relating to the revised Subject Benchmark Statement not covered in the questions above.

Paragraph 2.15 line 3 replace 'credit' by *credits*

Paragraph 1.26, section **Delivery** line 10 replace 'assignment' with *assessment*

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Southgate House, Southgate Street, Gloucester GL1 1UB
Registered charity numbers 1062746 and SC037786

Tel: 01452 557000
Web www.qaa.ac.uk