

# RESPONSE TO STUDENT CONSULTATION ON ALTERNATIVE STAGE 1 STUDY ROUTES FOR DEGREE PROGRAMMES IN PHYSICS

## SUMMARY

This is a response to the consultation on additional routes through Stage 1 of R51 BSc Physics and possibly Q64 BSc Natural Sciences (Physics) and Q77 BSc Mathematics and Physics. The consultation was held online between 23 April and 3 May 2021. The forum was moderated by Ben Johnstone-Bray (Associate Lecturer) and received contributions from 39 students.

The forum was themed around 5 discussion questions and the outcomes of the discussions were collated into a report by the moderator (attached as Appendix). This document presents a response to the points raised in that report. The forum discussion itself is accessible at <https://learn1.open.ac.uk/mod/forumng/discuss.php?d=114689>.

As noted in the report, the overall consensus was that there should be more options for study at Stage 1. In general, the School would like to take steps to provide additional routes at Stage 1 in R51.

Given the role of S111 as the common starting point for R51 and Q64, much of the discussion focussed on how well S111 fills the role of an introductory module that prepares students for Stage 2 study. The picture that emerges is that S111 is not seen by all students as a suitable starting point for a physics qualification, but that the reasons for this are varied. Our interpretation of the feedback is that there are three distinct cohorts that we should try to cater for:

- Students who like the broad-base in science and science skills development are reasonably well served by the current route. We refer to this as a ‘Standard Science’ route. The key areas for improvement for students on this path would seem to be better communications about resources that are available to prepare for MST124.
- Some students would prefer the mathematical grounding provided by MU123 instead of S111. This could be called a ‘Maths focussed’ route. A route that includes MU123 instead of S111 would require an additional 30 credits at Stage 1 to be chosen (possibilities include M140 and MST125). Providing appropriate advice to students considering this route would be essential to its success.
- There are some students, typically those with some prior study in sciences at A-level (or equivalent), who would prefer an advanced start at Stage 1 that by-passes S111, and possibly includes some Stage 2 curriculum (S284 being explicitly mentioned in discussion as a module of interest). This ‘Advanced Science’ route would also require the provision of appropriate advice and diagnostic material.

As noted above, a major factor in implementing these changes would be how we provide appropriate advice and guidance to students to ensure that they adopt the route that is most suited to their educational background and aspirations. In addition to ensuring preparedness, we also need very clear guidance about study order, recommended pre-requisites and implications for intensity of study (for instance, a ‘Maths focussed’ student who starts their studies with MU123 should only move on to MST124 when they have completed MU123).

It should be noted that the discussion from this consultation has already influenced our curriculum plans. The School has recently (October 2021) gained approval for an Integrated Masters qualification (M06 MPhys) which will include Stage 1 study paths that correspond to the ‘Standard Science’, ‘Maths focussed’ and ‘Advanced Science’ routes

described above. The first of these routes requires S111, the second allows study of MU123 without S111, and the third allows S111 to be by-passed and more advanced modules to be taken in Stage 1.

The School of Physical Sciences will seek to extend the same Stage 1 routes into R51 BSc Physics. It is clearly advantageous for students if there is common curriculum for these two qualifications at the start since this would allow students to decide between the BSc or MPhys qualification at some point in Stage 3, rather than at Stage 1.

We will share this discussion and response with the Board of Studies of the School of Mathematics and Statistics (who have responsibility for Q77 BSc in Mathematics and Physics), so that they can assess any implications for the Stage 1 requirements of Q77.

We will not at this stage be seeking to provide alternate Stage 1 routes into Q64 BSc Natural Sciences. This is because the broad range of sciences covered in S111 is important to the multidisciplinary approach of the degree and because it offers students more flexibility to change their study path within Q64 if so desired.

The consultation also raised other points related to routes through Stage 1 study:

- It was noted that some students felt that the development of programming skills should be better supported in Stage 1. This is a matter that was anticipated by the school, leading to a decision to enhance a study site about Python programming for physical sciences, to make it more accessible to Stage 1 students. This development work was carried out ahead of the October 2021 presentation of modules and the effectiveness of the revised site is being reviewed as part of a school scholarship project.
- There was support for the idea that SM123 should be offered in a February start presentation. The School will assess whether it is viable to implement this.
- It was suggested that a shorter (30 credit) module, paired with an existing 30 credit module, replacing S111 could form a useful role in introductory science. It is unlikely that we would have resources to produce such a module.
- Several students noted that S217 is a significant 'step-up' from S111 (and SM123). It was also noted that some students feel that the maths developed in MST124 is not used in S217. In the medium term the School plans to replace S217, and this feedback is useful in thinking about how to redesign our level-2 physics curriculum.

In response to the student consultation, the intentions of the School of Physical Sciences are:

1. To seek to implement alternate routes into Stage 1 study for R51 BSc Physics to match the routes into M06 MPhys that have already been approved. A key part of this change will be ensuring that students are properly supported in making decisions about their choice of route.
2. To continue to improve resources that help the development of programming skills in the context of physical sciences (noting that some development to support Stage 1 students took place over the summer of 2021).
3. To improve communications about the preparatory material for MST124 (so that S111 students are better prepared).
4. To explore whether it would be viable for the School to offer SM123 in a February start (in addition to an October start).

**Date:** December 2021

## APPENDIX

# Physical Sciences Board of Studies Consultative Forum

2021/04/20 – 2021/05/03

## Introduction

The purpose of this consultation was to get feedback on the current Stage 1 journey for R51 (BSc Physics), and also the Stage 1 journeys for Q64 (BSc Nat. Sci. Physics), Q64 (BSc Nat. Sci. Astronomy & Planetary Science), and Q77 (BSc Mathematics and Physics).

For reference, the aims and scope of the consultation, as described in the forums, are given below.

Currently the default Stage 1 of R51 for a student wishing to study 60 credits per year is S111 (60 credits), followed by MST124 (30 credits) and one of either SM123 (30 credits) or MST125 (30 credits). On Q64 we also allow M140 or TM129 as a 30 credit option in place of SM123.

Here we are exploring ways to provide additional routes through Stage 1 of R51, and possibly also Q64 and Q77. These could bypass S111 in favour of alternative modules. We would like to gauge your opinion about these potential other routes. Please note that we are not proposing to abolish the current Stage 1 journey, rather we are thinking about adding alternative routes.

Overall, there was a general consensus that more options for Stage 1 would be a big improvement. Particular criticism was levelled at the difficulty (or lack thereof) and credit value of S111, and the perceived jump between Stages, though these feelings were not unanimous.

Some questions were engaged with more than others. The number of posts received by each question (including moderator posts) is as follows:

- Question 1: 35
- Question 2: 39
- Question 3: 39
- Question 4: 26
- Question 5: 50

There were, as one would expect, different opinions expressed. There was no consensus on exactly which combination of four 30-credit modules would be ideal for Stage 1. However, there did appear to be almost unanimous agreement that more options would be better, even from those who had personally enjoyed S111.

Following are each of the five questions and a summary of the responses.

## Question 1

If you have already progressed beyond Stage 1 of R51, Q64 (physics), Q64 (Astronomy & Planetary Science) or Q77, how well prepared were you for Stages 2 or 3 on the basis of modules taken previously? Please say which Stage 1 modules you took.

### Responses

Many people commented, here and elsewhere, that S111 provides a gentle introduction to science study, which is useful for those with little previous experience and/or those who don't yet know which area of science they'd like to focus on. It was also said that S111, MST124 and SM123 were good preparation for SXPS288.

However, many people stated that S111 is quite easy compared to other modules, and a recurring comment was that the content is not challenging or deep enough to be worth 60 credits. Relatedly, many people agreed that S111 doesn't prepare one for the Stage 2 modules as well as it could. Several people stated that this is partly because it covers a wide range of topics that aren't always relevant to everyone's interests. Many people perceived there to be a big step between S111 and S217.

It was also stated in response to this question that MST124 is a good module, but that not all the mathematics learned is put into practice in later modules, specifically S217. This was also commented upon elsewhere.

## Question 2

How do you perceive the step between the mathematics taught in S111, and the mathematics you met at the start of MST124? Did you engage with the Revise and Refresh material written for students making the transition from S111 to MST124? Do you see any merit in the combination MU123 + MST124, followed by SM123 and another 30 credit module relevant to the Physical Sciences? What would be the advantages and disadvantages of such a combination?

### Responses

There was an overwhelming consensus that there is a substantial gap between the mathematics in S111 and the mathematics at the start of MST124. Many comments stated that S111 is very light on maths.

It was agreed that the Revise and Refresh material is very helpful, and that this does serve to ease the transition from S111 to MST124. However, two students did comment that they had been unaware of the Revise and Refresh materials until very close to the start of MST124. These two students both stated that better communication about the availability of such materials before the start of courses would be beneficial.

Many people felt that studying MU123 + MST124, followed by SM123 and another relevant 30-credit module would be beneficial, as it would provide a better foundation for the mathematics in MST124 for those who need it. It was also commented that this combination would be helpful for those who already know which area of science they'd like to focus on, and who therefore don't benefit from the broad science introduction given in S111.

The disadvantage to this combination was generally perceived to be that including this foundational material at Stage 1 would take up credits that could be used for other, more relevant topics, such as programming, or more advanced mathematics and physics.

Also noteworthy is that many people felt that MST124 is too demanding for a 30-credit module, though this was far from unanimous.

### Question 3

We are sometimes asked if we can provide a more challenging Stage 1 for those who have already some background in science or mathematics, such as relevant A levels. A recent suggestion was to include a 30 credit Stage 2 module as an option module in Stage 1, thus bypassing S111. A potential combination could be MST124 + SM123 + S284 + another 30 credit module relevant to the Physical Sciences. What would be the advantages and disadvantages of this alternative Stage 1?

### Responses

Many people expressed the sentiment, both here and elsewhere, that a more challenging Stage 1 would be very welcome. As already noted, it was repeatedly stated that S111 doesn't feel like a 60-credit module due to the level of its content. It was also stated that the physics content of S111 is very low, and that this is not ideal for those who keen to focus on physics.

Multiple students commented that S111 is not much use for those who already have any prior experience in science. Some of them felt disgruntled and somewhat short-changed at having to take this module and not being allowed to take other modules more suited to a) their level of knowledge and b) their chosen field of study.

There were many posts stating that this combination would be beneficial for those who already have previous educational experience of science and/or those who already know which area of science they want to focus on. Relatedly, it would allow students to cover more advanced areas of their chosen field, which would be more challenging, interesting, and beneficial.

There were also those who enjoyed the breadth of topics covered in S111. It was stated that the breadth of topics covered in S111 allows students to gain knowledge of different areas of science that they might otherwise not learn about. It was noted that this would be a disadvantage given the increasingly interdisciplinary nature of scientific research.

Another disadvantage that was noted by multiple students was that S111 covers practical skills and the scientific method, and these important areas would be missed. However, some students stated that SM123 covered these aspects well enough.

### Question 4

Are there any other OU modules you think should be included as part of R51 Stage 1? Feel free to present here your ideal qualification pattern, but please explain why you like it.

## Responses

This question didn't get that many responses, and few of them directly answered the question of what other OU modules should be included as part of R51 Stage 1. Perhaps this is because the options given in Questions 2 and 3 were the ones that appealed the most. However, there were suggestions for changes to Stage 1, and to the pathway.

It was suggested that a practical module, similar to SXPS288, would be beneficial at Stage 1, as this would introduce some necessary practical skills earlier on, and would allow for more module choices at Stage 2.

One person suggested that more mathematics at Stage 1 would be beneficial. Their ideal qualification pattern was a rehailed (and presumably shorter) S111, along with MST124, MST125 and M140.

Another person suggested taking inspiration from the routes into Q31 (BSc Mathematics), and allowing for a) a broad Stage 1 for those with little experience of science, and b) a focussed Stage 1 for those with previous education in science. The ideal qualification pattern suggested was MST124, MST125 and SM123 in both routes, with S111 available (as a shorter 30-credit module) for those without previous science education and S284 available for those with a stronger science background.

Multiple students expressed that they would like to study more astronomy and astrophysics modules, both at Stage 1 and later. One commenter suggested the idea of a degree in Physics and Astronomy degree that would allow students to take S217, S283, S284, S382 and S383, which seemed popular.

## Question 5

Are there any other issues relating to Stages 1 and 2 of R51 you wish to bring to our attention? For example, would you see any advantage in offering a J and a B start of SM123? Another 30 credit module relevant to the Physical Sciences? What would be the advantages and disadvantages of such a combination?

## Responses

Many people liked the idea of offering a J and a B start to SM123. They said that this would make it easier to balance their workload and study SM123 alongside MST124, which they considered to be quite challenging.

Many people took this opportunity to state that the programming in SM123 is very difficult for those without prior experience in programming. They felt it would be helpful if this was introduced earlier at a gentler pace. Even some of those with prior programming experience said the Python content of SM123 was difficult. However, there were also some students who disagreed with this, and said they found the Python content to be manageable. One student specifically asked for preparatory Python materials similar to the Revise and Refresh materials for MST124. They also stated that the Maxima guidance in MST124 is very good, and that a similar document for the Python in SM123 would be very useful.

Multiple people suggested that having more programming at Stage 1 would be useful, and some also stated they'd have liked more coverage of practical skills and mathematics. The idea of an early module covering practical skills, including programming, seemed somewhat popular.

Something else noted was that there are numerous errors in the S111 materials, such as typos and grammatical errors. It was also noted that such errors are also present in materials for other modules.

## Other comments

The three most flagged posts are shown below. All three are responses to Question 1.

I took S111, MST124 and SM123 at stage one.

S111 I found had a lot of areas in there which, although interesting, were perhaps not the most relevant. It was also quite light on the maths. I think for anyone taking physics it could be improved by having a bit more maths content at a slightly higher level and also some python programming. Python has been a struggle for me this year in SXPS288. My only experience of it was from SM123, if python could be introduced earlier to those on a physics route then perhaps more advanced material could be included in SM123. If, like myself, you have limited exposure to programming this would be a positive.

SM123 was good but I feel did not push me enough overall. There seems to be a big jump between SM123 and S217 which came as a bit of a shock to the system.

MST124 was an excellent module. I loved the fact it came with books, so much easier to study from I find. If anything I found it overprepared me for S217 in terms of maths. The regular in person tutorials, including at weekends, were fantastic. Whilst starting out with OU maths was the thing that worried me most, in actual fact MST124 has been the highlight for me so far.

Slightly off topic but the lack of weekend tutorials on the level 2 modules has been a real let down so far. I always found in the level 1 modules most of the time there was the option to attend at a weekend. This was extremely valuable as I can rarely fit evening, weekday tutorials around work.

## Further thoughts on S111

Hi,

It's refreshing and interesting to read the views of others who are somewhere or other on this road.

I had a clear view of the pathway that I wanted to follow from Day 1. I'd also done A level sciences and maths (but a very very long time ago).

I think we need to bear in mind that the OU is proud to be 'open to all' and we should value that as students. To some, S111 is their first formal encounter with science. I said it 'was a doddle' but that isn't very tolerant of me. I found (most of it) a doddle and that was lucky for me, starting with at least a smattering of science background.

My second reflection is that our specialist appetites develop over time. I now find myself keenly engaged with astrophysics, but I didn't know that on Day 1 of S111 and at one stage I got mildly interested in geology but too many cryptic names of minerals and a lack of equations cured me of that! My point is that some people will go into S111 without a passion that's developed and others will develop a passionate interest in some topic, either during S111 or at a later stage in their studies.

Our passions and interests keep on developing. For example, as an amateur astronomer of 30+ years, S282 (rest its soul) was a turning point for me. I went through a debate with a couple of tutors along the lines of 'why do we look through telescopes when there's acres of data that we can never gather for ourselves'. That's just a personal cathartic moment; we should create space for others to go through similar discoveries and realisations.

On reflection, perhaps Level 1 is about showing the full 'menu' rather than assuming that folk know what they want to eat when they walk through the door.

A final reflection after reading some posts. In no way meaning to be critical and firmly supporting freedom of choice, perhaps the OU could be clearer about the consequences of studying outside the recommended sequence(s) of modules. I'm sure that if I'd started with, say SM123, S111 (as a mandatory) would have been less satisfying. It's a pleasant 'warm up' that some find easier than others.

I would like to recommend that the mathematics learned in MST124 be put into practice in S217, there is no reason to keep the mathematical content at a low level after taking such an excellent mathematics course; I think some of the momentum is lost.

## Summary

It is clear that many people would prefer an alternative Stage 1 journey for R51 (BSc Physics), and also the Stage 1 journeys for Q64 (BSc Nat. Sci. Physics), Q64 (BSc Nat. Sci. Astronomy & Planetary Science), and Q77 (BSc Mathematics and Physics). A large number of people felt that S111 is too easy, and doesn't prepare one for the more advanced materials met later on. People are generally impressed with the modules on offer in Stages 2 and 3, and would like more opportunities to study advanced material that is directly relevant to their interests.