Case Study

Module Selection from a Student Perspective: A School of Physics and Astronomy Student Summer Internship

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Abstract
Within the School of Physics and Astronomy at the University of Birmingham there are many optional modules available to students throughout their degree programs. It is the students' responsibility to plan their choices through their course and to seek advice on suitable combinations. Funding was secured from the College of Engineering and Physical Sciences for a summer project to investigate if this advice could be made more readily and consistently accessible to students. The objective was to look at the module selection process from the student perspective. This article details how the undergraduate population and academic staff were surveyed to ascertain what information was most requested and its optimal format – and how it could be made available to students. The resulting changes made to current module information given within the department and the additional resources created to help students in making their choices are then discussed.

Introduction

Physics is a hierarchical subject. At the University of Birmingham the core subject material is concentrated into the first two years of the degree programme. The final one or two years, depending on whether a student is enrolled on the BSc (3year) or MSci (4 year) programme are then tailored by the student to their strengths and intended study or employment destinations post graduation. This 'tailoring' is achieved via the selection of combinations of options. It might for instance be that the student has a preferred pathway, for example specialising in medical physics or an emphasis on numerical modelling and data analysis. However, the hierarchical nature of physics education remains – and as a result there are prerequisites for all modules: they rely heavily on content taught in previous modules.

It is essential for students to plan their way through their degree to ensure they have chosen the correct options in order to take the modules they wish to study in later years. This can be particularly challenging for the circa 80 students who choose to complete a 4-year undergraduate masters course as they are planning two years worth of study. The project described in this article was carried out as a three-week summer internship in the School of Physics and Astronomy. Its objective was to provide an analysis of the currently available module choice information in terms of detail and ease of access and to then suggest, and implement where possible, improvements.

The Project Team

At the time of the project James Kendrick (JK) had completed his fourth year of a five-year degree MSci Physics with Particle Physics and Cosmology (with an intercalated year in Computer Science) and Helen Ansell (HA) had completed the second year of a four year MSci Theoretical Physics programme. Both students had been part of the active student representative system within the School and were well known to the other undergraduates – essential as student opinions would need to be collated over the summer vacation.

Nicola Wilkin (NKW) had put in place a system of advice for second year choices, via a 'module selection fair'. This could be placed in the first semester of second year, as the choices are timetabled for the second semester. At the fair all lecturers of optional modules had discussed the type of material they would cover, how they would deliver it, and how mathematical the material would be. Importantly, they also detailed which modules would require this knowledge in later years. In the third year there is a half-day of discussion about modules to inform module choices, but the number of options prevents the detail being discussed as for the second year.

Student Questionnaire

At the time of the internship two of the authors (HA and JK) had both recently chosen modules for the next academic year, and so had experience of the process of choosing modules as it was at the time. Having come from different degree programs and different year groups, HA and JK had a wealth of possible ideas for improving the portrayal of the module information.

In order to gather opinions from our fellow students a questionnaire was created for all students who had just completed Years 2,3, and 4. The survey was sent to students via email and also via Facebook groups for each year group and the University Physics Society. There were 72 responses in total, split evenly across the year groups.

Students were asked to rate how useful they found each of the following pieces of module information:

- Course content
- Mathematical content
- Assessment format
- Prerequisites
- Which modules it is a prerequisite for
- Course material availability
- Availability of support (e.g. examples classes).

Utilising the six-point scale in Figure 1.

Not useful	Slightly useful	Quite useful	Very useful	Important	Crucial

Figure 1: The six-point scale for capturing student views.

The responses indicated that students surveyed found the current information to be very useful. Indicating that the project objective should be to supplement and make more accessible the existing information.

Students were also asked, 'Is there anything else you consider when choosing a module?' as an open text question. Of the 45 responses to this question, 30 comments indicated that the lecturer was a consideration when choosing modules.

One student commented:
'For me the style of lecturing is quite important. I prefer handwritten notes which are then uploaded to canvas. However, I know other people prefer PowerPoint presentations given as hand-outs during the lecture.'
The majority of the remaining comments concerned timetabling and how particular modules might complement each other.

Open text questions asked students what they thought the best way to track module choices was, additional considerations when choosing modules, and improvements that could be made to the current information given. In response to the question 'Are there any other improvements that could be made to the way module information is communicated?' there were 44 responses. Of these, 60% commented that a flow diagram or visual aid would be useful in helping choose modules.

Working With Staff

In response to the student survey results, a discussion was held with the Heads of Years and then all teaching staff were surveyed via an emailed pro forma. They were asked about the mathematical emphasis of the modules they currently taught and to give examples of specific mathematical topics that are particularly important for the module. They were also asked to give details of their modes of teaching delivery and the resources they made available to students on the University's virtual learning environment, Canvas. Finally, the pro forma asked if students ever contacted academic staff with any particular questions about optional modules. The responses indicated that most lecturers were not usually contacted for information about modules during the selection process.

Programme coordinators were also consulted to discuss possible pathways through a degree. This gave a different perspective on what students on different programmes might need to consider when choosing their optional modules.

Module Information Templates

From the work that was completed, it became apparent that there were various areas in need of standardisation throughout the School, especially with respect to the format of the information given to students. There were different templates used providing the module information, making it difficult for students to easily compare modules.

A Canvas pages was therefore produced for all of the modules available in the physics department. Having looked into the options available, they felt that storing the information on Canvas was the most efficient mechanism available to keep it up to date and to make it easily accessible for students. They produced standardised templates for module information, with guidance for what information should be contained within each section, and an approximate word limit for the module descriptions.

What is a Prerequisite?

It was found that the term 'prerequisite' needed clarification because it was not being used with a standard meaning. Some teaching staff were prepared to allow students to take particular modules without having taken the 'prerequisite' modules, considering these modules as good background knowledge rather than having essential content for the particular course. These examples provided a clear contrast to where students were not allowed to take a module without having successfully taken the prerequisite module. Some teaching staff chose to list 'advised prerequisites' but again this was without any common definition. It was also noted that some modules gave a more thorough list of prerequisites than others – some listing the previous years' compulsory modules as prerequisites for their module. For improved clarity, separate sections on the module information templates were created for prerequisite and advised modules and gave the definition of each that should be used.

Mapping out the Physics Programme

A 'module map' for each physics degree programme was produced which had been suggested by many students in the survey. This module map was a diagram showing all of the available modules, arranged in columns according to the year group. Compulsory and optional modules were shown in different colours and the prerequisites for optional modules given by arrows. The number of credits to be chosen were given for each year group. Care was taken to ensure the colours chosen for the map could be distinguished by those with colour blindness.

The module map was then used as a basis for creating sample pathways through degree programmes. The aim was to help students think about where their interests lie by listing possible modules that could be taken in each year focusing on certain areas of physics. Concern was raised that students may simply choose a particular pathway without properly considering their options, or that some options would be seen as favourable to others if they appeared more frequently in the pathways. To ensure this would not be the case all optional modules were included in at least one of the possible pathways and a wide range of possible focuses was created.

Teaching Profiles

Profiles were created for each member of teaching staff, including contact information, their main teaching methods for each of the modules they teach and the resources they make available to students on Canvas. These are stored on Canvas and are available to students as links from the relevant module pages.

Mathematical content

The optional modules vary in the selection of mathematical techniques they rely upon. The survey indicated that 82% of respondents rated the mathematical content as 'very important' (4/6) or higher on the scale used. It was understood that some students would preferentially choose modules with a higher mathematical content, while others would choose the modules of a more qualitative nature. There was much discussion about how to display the information, to avoid the modules appearing to be ranked. It was decided to include information indicating the level and nature of mathematics required and the particular areas of mathematics relevant to the course within the module information template.

Summary

During this relatively short (3 weeks) internship the School of Physics and Astronomy acquired valuable insight into the structuring of its information delivery for the process of selecting modules. Suggestions for improvement were made based upon results of a student survey, working with members of staff and HA and JK's own suggestions. The way in which module information is now presented and created was clarified and supplementary resources produced to aid students in their selection of modules. The results of the project were disseminated via an information poster (see Figure 2) for students which is on display in the Physics department and provides a summary of the main work completed, including an example of a module map, which is also available on Canvas.

Feedback on the new resources available was obtained through the student representative committee. A general discussion of the changes that had been made and the additional resources available concluded that the students have found them to be very useful.

One student said:

'The module map helped me shape the remainder of my degree, and made the decision making process a lot easier.'
Undergraduate student, School of Physics and Astronom

Another student added:

'Being able to see prerequisites for all modules in one place was really useful. Having an overview of the key information for all modules on a single page made choosing modules much easier.'
Undergraduate student, School of Physics and Astronomy

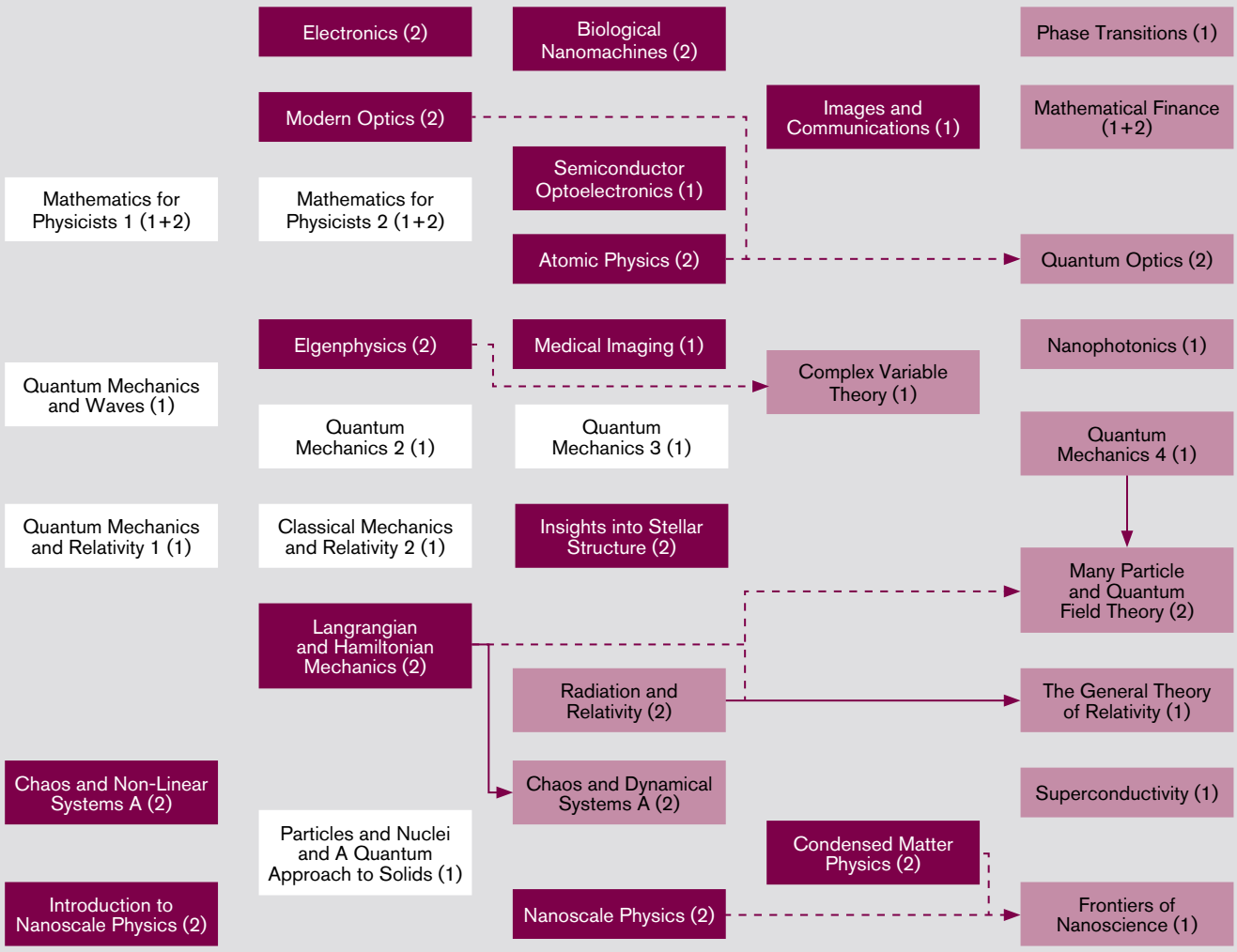

Figure 2: Example of a module map.