

Closing the Loop

In their 2006 assessment report, the department reported that the results of their annual exit interviews (a written questionnaire completed by all graduating seniors) indicated “students feel that they have learned a lot and that they have very well developed problem solving skills. Most students also realize that there is much more to learn.” One of the themes that emerged in the analysis of student recommendations was that students felt that courses offered every two years were out of sequence, particularly when PH317 Mathematical Physics was taken in the senior year.

For example, student **D** in 2006 reported:

As far as my mathematical abilities, I feel like I have not really learned a whole lot. I can understand the mathematics involved, but as far as applying them on my own I struggle with it oftentimes. Part of the problem I think was the order in which courses were offered. Our class had to take E&M and Quantum before the second semester of the math-physics, and it was literally impossible to follow along and understand. When we finally took the math, I typically did not try to understand the physical applications because I knew the classes that I needed it for were already over. If my future requires them, I know I can re-learn them easier than the average person, but as for truly knowing it and understanding the math I am behind.

As a result, the department decided to introduce a change in curriculum:

We have reorganized the way we teach mathematical physics:

- Changed some of the material covered in EP 217 – Mathematical methods of physics and engineering (taught in spring of the sophomore year).
- Eliminate PH 317 – Mathematical Physics.
- Add a 1 credit lab/workshop to each of the upper division core physics courses.

Motivation: PH 317 – Mathematical Physics was originally intended to develop the mathematical tools students needed for the other core upper division physics course (PH 315, PH 365, PH 445, and EP 451). Originally, it was taught in the fall semester of junior year. However, since we started teaching the 300 and 400 level courses on a two year rotation some students only took it in their senior year after completing PH 365 and PH 315. All students find PH 365 a difficult course but most students who took it before PH 317 hated the course. To solve this problem we have eliminated PH 317 and will teach the mathematical tools as needed by the upper division courses. To achieve this we have added a 1 credit lab/workshop associated with each of the four upper division core courses that remain.

Relevant Data from Exit Interviews

The chart below presents the number of respondents who reported feeling underprepared for the math required in upper-division physics courses, many of them requesting MORE math, as well as the number specifically commenting on courses seeming out of ORDER.

Year	N	MORE	ORDER
2003	6	4	0
2004	3	0	2
2005	5	1	3
2006	5	0	1
2007	6	0	0
2008	8	0	0
2009	6	0	0
2010	6	0	0
2011	2	1	0
2012	3	0	0
2013	0	0	0
2014	3	0	0

Summary of Results

Prior to the change, student comments about math preparation and course order are extremely common. After the change to the curriculum, only one respondent (out of 34) reports a need for more math instruction and none felt like courses were offered in the wrong order. The change seems to have accomplished its desired purpose.