

Do Marlboro students take Math and Science classes?

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Feb 12th 2012, updated Feb 21st 2012

Short answer: some do, some don't.

A longer answer...

Ian Kozak very kindly rustled up some data for me to play with. There's more to do, but here are the headline figures and graphs.

Some definitions and restrictions first. We only looked at students who complete their full education at Marlboro (called *Marlboro-only students* on the graph titles). For the math component at least, I suspect that those who transfer in are doing so from places where a higher proportion of students take some math and so the numbers are not as bleak as they might appear.

As well as the transfer students there are (at least) a couple of other categories of students about which we perhaps don't need to worry (assuming the "worry" is a lack of quantitative reasoning (QR) skills among some of our graduates). First, some students come in with better QR skills than many have after a course or two here that promotes QR. Second there is a small (but non-zero) number of students who put some serious not-for-credit work in during their senior year in order to improve their GRE performance.

There is also the question of what qualifies as a math course and the issue that math and QR are distinctly different activities (much as poetry and clear writing are). A math course for the purposes of the numbers and graphs given here is one that is listed under the math section of the course list or given a "see also" from there (and Ian did a bunch of work to go back over the last twenty years to tidy up that list). This is, at best, a just-about-adequate proxy when answering such questions as "Do Marlboro students engage with Math while here?" and "Do Marlboro graduates have acceptable QR skills?"

That said, Figures 1 and 2 give the picture from the last twenty-odd years. In a nutshell, the proportion of students who take math has been slowly rising (about 1 percentage point per year) over that time to reach the point where about half of Marlboro-only students take some math.

What about Natural Science courses? These are at least easier to define: they're the ones with an NSC course label. Similar issues to before remain, however. NEASC, for example, requires that "[g]raduates successfully completing an undergraduate program demonstrate... the ability for scientific and quantitative reasoning." Is taking a Natural Science course either necessary or sufficient for this?

Here the summary is that about three-quarters of Marlboro-only students take a Natural Science course and this number has remained fairly constant over the last twenty years. Figures 3 and 4 give the equivalent graphs to those given for math classes.

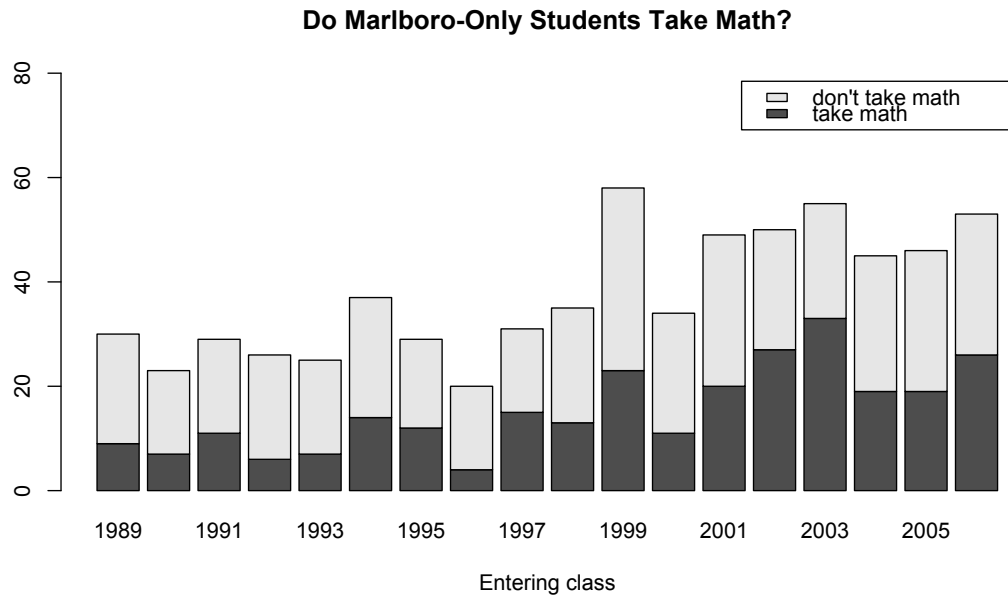


Figure 1: *The number of students graduating each year split into those who did and those who did not take any Math. Only those who spent their whole undergraduate career at Marlboro are included.*

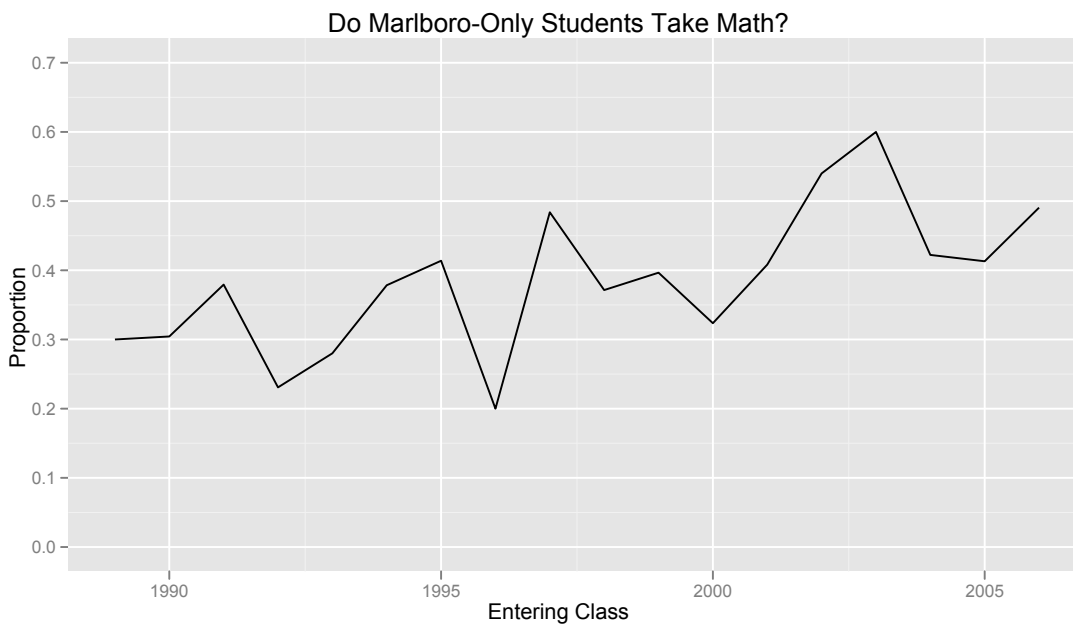


Figure 2: *The proportion of students graduating each year who did take Math. Only those who spent their whole undergraduate career at Marlboro are included.*

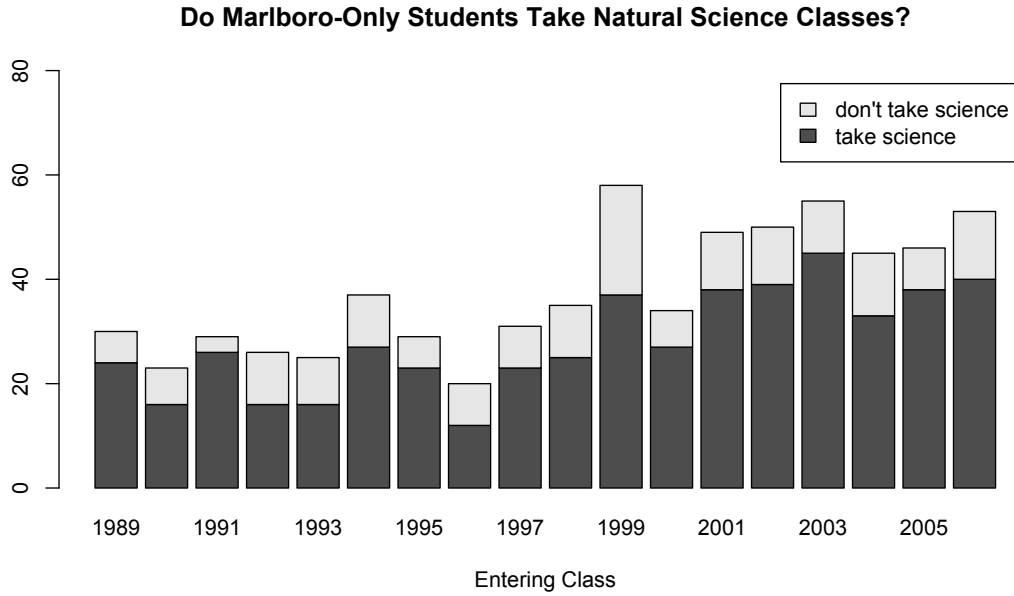


Figure 3: *The number of students graduating each year split into those who did and those who did not take any Natural Science courses. Only those who spent their whole undergraduate career at Marlboro are included.*

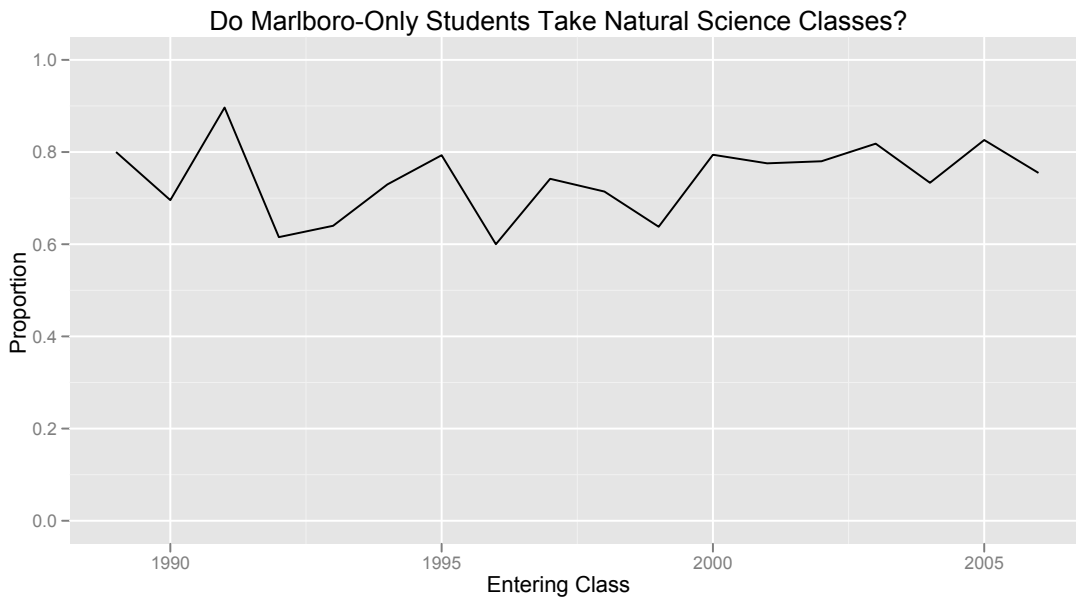


Figure 4: *The proportion of students graduating each year who took a Natural Science course. Only those who spent their whole undergraduate career at Marlboro are included.*

Let's take as a working assumption that we want more students to take at least one math class.

We now consider at what point during their time here Marlboro-only students take their first math class (if they do). How does this compare with the profile we might want or expect? (What profile *do* we want or expect?)

The *nominal semester* is the one the student is classed as at the time (Freshman 1 is 1 and Senior 2 is 8), and so is not a measure of how long they've been here. Some Marlboro-only students come in with some AP credits or similar and start as Freshman 2 or, later in their time here, skip a class. Alternatively, students who take nine or more semesters to complete will repeat at least one of these nominal semesters.

Figure 5 is a mess. The one thing in its favour is that it includes a lot of information.

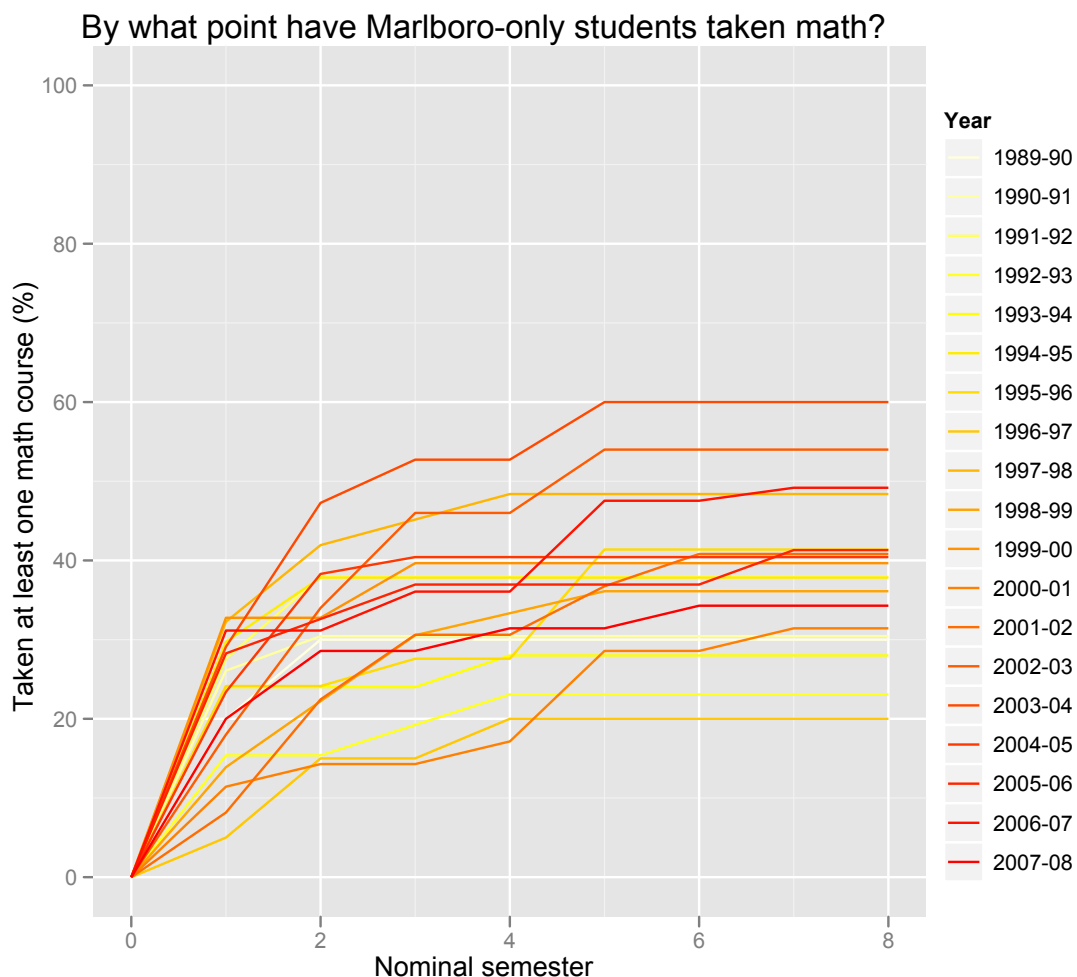


Figure 5: *The proportion of graduates who have taken at least one math class by the given semester of their time here, broken down by year. Only those who spent their whole undergraduate career at Marlboro are included.*

Before moving to a more comprehensible picture, there are a few points I want to mention.

- I let the y-axis run up to 100% so that we could see the expanse of grey that we're failing to reach into.
- The slow increase in the proportion over time corresponds to the hotter colours (darker greys, if you're following along in black and white) tending to be above the cooler ones.
- The shape is reasonable: a steep start as those inclined to take math do, followed by a levelling off.

Figure 6 takes the last five complete years of data and amalgamates them. This should smooth out some of the noise and wrinkles caused by the specifics of what is offered in a particular semester.

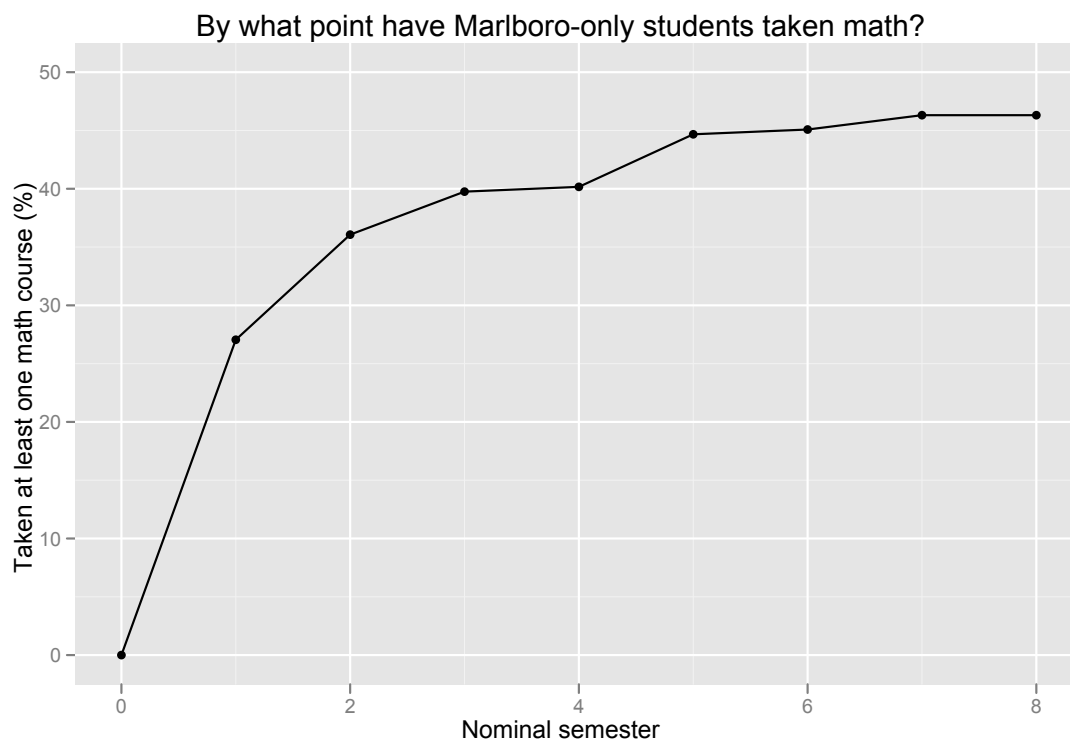


Figure 6: *The proportion of graduates who have taken at least one math class by the given semester of their time here. Only those who spent their whole undergraduate career at Marlboro, starting with the entering class of Fall 2003, are included.*

I'll comment here on a few features that stood out for me. What, if anything, to do in response to these features is left for future discussion.

Most of those who take math at all do so in the freshman year. There is also a good bump in the Junior 1 semester. Is the latter due to plan sponsors taking over advising

duties and saying “take Calculus”? Or is this the point that those wanting a B.S. degree realise that they have to take some math?

The flatter lines in Sophomore 2 and Junior 2 are more puzzling to me. For students in the social and life sciences, Statistics is the one math course that I think should definitely be taken (and has been tailored for such students while trying to also keep a broader appeal). These two semesters are the ideal time to take it and it has been offered every Spring since 2007—it should show up in the data if this is actually happening.

Over the nineteen years for which I have data, 430 Marlboro-only students entered their Senior 2 semester without yet having taken math. Not one of them took a math class.

These last two points are consistent with the idea of plan creep. The idealised version of plan that I have in my head (and I accept often has little similarity with how it works in practice) is about 4 credits pulled forward from the sophomore year and about 12 credits per semester for the junior and senior years. This means that Sophomore 2 is the perfect time to add breadth and that there is space for a non-plan course of some sort most semesters after that which again can be used for breadth. There’s no particular reason to expect that breadth to get used in math, but I’d expect/hope some of it to be.

What do the graphs say to you? What are your ideas for addressing the issue? Does it need addressing? What is the issue? Is there other data you’d like to see?