

|   |  |
|---|--|
| <b>Math 1a</b><br><b>IMPORTANT</b><br><b>ANNOUNCEMENT</b> |  |
|---|--|

November 11, 2009

Ma 1b and 1c will both be split into two tracks: “Practical” and “Analytic” (described below). Ma 1b will discuss linear algebra, and Ma 1c multivariable calculus. The two tracks will have different lectures, sections, texts, and procedures. You must choose one or the other by the beginning of the winter term. We hope that as many of you as possible will be able to choose at Pre-registration (indicate either Ma 1b-Pr or Ma 1b-An) to help us organize the sections.

**Ma 1b:** Ma1b is devoted to linear algebra. The analytic track will study vector spaces over the real and complex numbers from an axiomatic point of view. The text for the analytic track will be Apostol, Volume II. The course will correspond roughly to the first five chapters of the text and will include a treatment of the following topics: vector spaces; inner product spaces; subspaces; dimension and bases; linear transformations; systems of linear equations; matrices; determinants; eigenvalues and eigenvectors; the characteristic polynomial; symmetric, hermitian, and unitary matrices. The practical track will work in  $\mathbf{R}_n$ , with emphasis on  $\mathbf{R}_2$  and  $\mathbf{R}_3$ . Also it will emphasize matrices over linear transformations. It will cover essentially the same material as the analytical track, but the emphasis will be on concrete situations, intuition and computations.

**Ma 1c:** Ma 1c will be devoted to multivariable calculus, including derivatives of vector functions, multiple integrals, line and path integrals, and the theorems of Green and Stokes. Again, in the analytic track, linear algebra will be treated from the axiomatic point of view and the vector calculus will be developed in arbitrary dimensions, while the practical track will concentrate on two and three dimensions. More generally, the development in the analytic track will be from a conceptual point of view, while the approach in the practical track will be more intuitive with an emphasis on potential applications.

The workload in the two tracks will be comparable. Students in either track can go on to major in any subject, including physics or mathematics. Both groups will be prepared as far as subject matter is concerned, although the analytic track will emphasize the kind of reasoning that is also used in the analytic track of physics and in Phys 12. The lectures for the two tracks will be at the same time as each other and also as Ma 1a, namely MWF from 10:00 to 10:55.

## **MAKING A DECISION**

To first approximation, it is likely that those students who choose the analytic track in physics will also want to choose the analytic track in mathematics. This is because the interests and abilities that would make one choice or the other attractive for the physics option are very similar to the interests and abilities that would make the corresponding option in mathematics attractive.

While it is true that you are likely to want to make the corresponding choice to the one you will make in physics, we would emphasize that this is in no sense required; and in some cases, it may be that students will be in opposite tracks in mathematics and physics. In particular, neither track in either subject will assume that the students are in the parallel track in the other subject.

During the first two weeks of class, it will be possible to change between tracks. In addition, it will be possible to change tracks between Ma 1b and 1c and between Ma 1c and 2a. However, if you change from the practical to the analytic track, it may be necessary to do some collateral reading to cover some topics that will be done in the analytic track but not done in that way in the practical track.

Should you have any questions about the choice, please consult one of the Ma 1 professors, your TA, or your advisor. The Ma 1b professors are Michael Aschbacher (analytic track) and Rick Wilson (practical track). The Ma 1c professors are Dinakar Ramakrishnan (analytic track) and Jerrold Marsden (practical track). It may also be useful for you to speak to sophomores who might be able to give you advice based on their own experiences.

