19th February 2007

To: Terryl Hallquist, Chair, Committee on Educational Programs
From: Mark N. Ellingham, Director of Undergraduate Studies, Mathematics
Re: Proposed revisions to major and minor in mathematics

Attached please find a proposal for revisions to the major and minor in mathematics. Please let me know if you have any questions. I would be happy to appear at a meeting of the CEP if you feel that is necessary.

Copies to:
   Associate Dean Kate Daniels
   Michael Muise
Proposed Revisions to Major and Minor in Mathematics
19th February 2007

Background

The Department of Mathematics has been asked by the Arts and Science Registrar, Beth Rogers, if it would be possible to simplify our programs to make them easier to implement in the new online audit system. At the same time, we have taken the opportunity to include in the major some options (particularly involving Math 196) that have been informally available but not formally part of our programs.

Therefore, the descriptions below are basically a rewriting of our current requirements in what we hope is a slightly simpler form, along with some clarifications, and with the option of using Math 196 to satisfy some of the requirements in the Program II major and the minor.

There are some effects of these revisions. Except for the inclusion of Math 196, they are mostly minor. They are as follows.

1. Students may include Math 196 together with a ‘linear algebra intensive’ course (Math 204, 205a-205b, 226, 253, 288) to satisfy the linear algebra and differential equations requirements of the major. Math 196 was introduced about four years ago at the request of the School of Engineering. It is a 4 hour combined course in differential equations and linear algebra that is a required course for several Engineering programs. It contains as much differential equations material as our regular courses in that area, Math 198 and 208, but not as much linear algebra as our regular courses in that area, Math 194 and 204.

   The Undergraduate Committee in the Department of Mathematics at the time Math 196 was established felt that (a) we would prefer students not to take this if they wanted to major in mathematics, but (b) if they did take it we should count it towards the major, and (c) since it contained some linear algebra, but not as much as Math 194 or 204, students who took Math 196 should take another ‘linear algebra intensive’ course to reinforce their linear algebra skills. This policy affected only Engineering students, and was implemented informally by the School of Engineering because at the time they did the math major audits for their own students. Since then, audits for math majors in all schools have moved to the College and the online system, so Math 196 needs to be made part a formal part of the major. It is still not a recommended option and we wish to make this clear.

2. Math 201 (Introduction to Mathematica) no longer counts for the major or minor. The instructor who taught this course on a regular basis has left Vanderbilt and the Department of Mathematics intends to delete this course.

3. We now officially allow students to use Math 150a-150b-170a-175 as a calculus sequence, substituting Math 175 for 170b. Math 175 contains a little more material than Math 170b, although they are both 3 hour courses. Math 170b is not offered every semester, but Math 175 is.

4. The current calculus requirement is not stated correctly with respect to Math 205a-205b, in that it does not indicate that students taking Math 205a-205b can count their AP credit hours for Math 155a-155b towards the major. Students are supposed to have AP credit for Math 155a-155b before taking Math 205a-205b. This has been corrected in this revision.

5. We have changed some requirements in terms of number of courses to requirements in terms of credit hours, to allow the requirements to accommodate students who have courses with unusual numbers of hours from transfer credit, Study Abroad credit, or independent study courses.

   Note that the Department of Mathematics is working on a reform of its overall curriculum. Therefore, the revisions here may only be in effect for a year or two before we introduce significant changes. However, the Registrar has told us that it is still worth going ahead with these changes to simplify the online audits.
Proposed new catalog descriptions

Program of Concentration in Mathematics

Two programs of concentration are available. Program I is intended for most mathematics majors in the College of Arts and Science and requires a minimum of 32 hours in the department. Program II is intended for students in the School of Engineering who elect a second major in mathematics, but is also available for other students. Program II requires a minimum of 29 hours in the department in addition to 6 hours outside the department. Requirements for the two programs are summarized below.

Program I.
At least 32 hours in mathematics, as follows.
1. A calculus sequence: 150a-150b-170a-170b, 150a-150b-170a-175, 155a-155b-175, or 155a-155b-205a-205b.
2. Linear algebra and differential equations: 204 or 205a-205b, and 208.
3. At least 15 hours from 200, or 210 and above.
4. The remainder of the hours must be chosen from 200, or 210 and above.

Program II.
At least 29 hours in mathematics and 6 hours outside the department, as follows.
1. A calculus sequence as in Program I.
2. Linear algebra and differential equations: one of the following:
   (a) one of 194, 204, or 205a-205b, and one of 198 or 208; or
   (b) (not recommended) 196 and one of 204, 205a-205b, 226, 253, or 288.
3. At least 12 hours not used to satisfy item 2 from 200, or 210 and above, excluding 252.
4. The remainder of the hours in mathematics must be chosen from 200, or 210 and above.
5. At least 6 hours of advanced, mathematically based science or engineering courses approved by the director of undergraduate studies. This requirement is automatically fulfilled by students who complete a physics major or a major in the School of Engineering.

Minor in Mathematics
The minor in mathematics requires at least 15 hours in mathematics, including:
1. Completion of a calculus sequence: 170b, 175, or 205a-205b.
2. Linear algebra and differential equations: as in the Program II major.
3. At least 6 hours not used to satisfy item 2 from 200, or 210 and above.

Mark N. Ellingham, Dietmar Bisch,
Director of Undergraduate Studies, Chair,
Department of Mathematics, Department of Mathematics.