

## Justification for these changes

For most research areas, the math department offers a two semester first year graduate sequence as well as a small number of regularly offered second and third year graduate courses. For example, the algebra and number theory research area offers Math 5210-5211 (Abstract algebra I and II) followed by Math 5220 (Introduction to representation theory) and Math 5230 (Algebraic number theory). We also offer Math 5320-5321 (Algebraic geometry I and II) which sits somewhere between the algebra research area and the geometry research area.

In addition, each research area offers graduate topics courses which cover a wide range of potential topics. The topics for these courses are typically driven by a combination of current faculty research interests and graduate student needs. For example, if a particular faculty member has multiple graduate students, they may offer a topics course covering an area of overlapping background interest to his or her students. It is difficult to give a specific list of these topics. While some topics are repeated, the length of time between any particular topic being offered tends to be large, on the order of 5-6 years.

To give two concrete examples, I have listed below the topics covered in Math 5026 by the logic research group and in Math 5020 by the algebra and number theory research group going back to Spring 2006. Students who discover an interest in a particular research area early on in their graduate careers often take these topics courses many times. Several logic students in recent years (Matt Jura, Tyler Markkanen, Oscar Levin and Amy Turlington) repeated Math 5026 seven times, each time with a change of topic. The same could be said for students in algebra. One of the current algebra students (Matthew Lamoureux) will be taking Math 5020 for the seventh time this spring. (I could list many other algebra students who have graduate in recent years and have taken Math 5020 more than four times if the committee wants more concrete examples.) The important point is that these students are not getting credit for completed coursework because of the restriction on the number of times a topics course can be repeated.

- Math 5026 topics

Spring 2006: Computability theory

Fall 2006: Model theory

Spring 2007: Reverse mathematics

Fall 2007: Higher recursion theory

Spring 2008: Set theory

Fall 2009: Proof theory

Spring 2009: Computable algebra and model theory

Fall 2009: Set theory

Spring 2010: Set theoretic forcing

Fall 2011: Computability theory

Spring 2012: Proof theory of arithmetic

Fal 2012: Model Theory

Spring 2013: Algorithmic randomness

Spring 2014: Reverse Mathematics

- Math 5020 topics

Spring 2006: Modular forms and L-functions

Fall 2007: Geometric representation theory

Spring 2008: (1) Automorphic representations and (2) Homological algebra

Fall 2009: (1) Class field theory and (2) Topics in algebraic geometry

Spring 2009: (1) Arithmetic of elliptic curves and (2) Algebraic combinatorics

Fall 2010: Representations of algebras

Fall 2011: Local fields

Spring 2012: Tate's thesis

Fall 2012: Commutative algebra

Spring 2013: (1) Arithmetic of elliptic curves and (2) Tilting theory

Fall 2013: (1) Representations of  $GL(2)$  and (2) Homological algebra

Spring 2014: Advanced representations of  $GL(2)$