



# MATHEMATICS COLLOQUIUM

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You are invited to join us for a department colloquium:

**Title:** Is it harder to factor a polynomial or to find a root?

**Speaker:** Russell Miller, Queens College Mathematics

**Date:** Wednesday, September 23, 12:15–1:05

**Location:** Kiely 283

**Abstract:** For a polynomial  $p(X)$  over a field  $F$ , two basic questions arise: whether  $p(X)$  factors over  $F$ , and whether  $p(X)$  has a root in  $F$ . Clearly these questions are related, but it is not obvious which one is more difficult—or even how one measures “difficulty” in this context. Computability theorists have several measures of relative difficulty of computation, and we will explain them and examine how they can be applied in this situation. The coarser measures indicate that the two questions are equally difficult, but there is a finer measure,  $m$ -reducibility, quite common in computability theory, which indicates that for algebraic fields, one of these questions is always at least as hard as the other, and can be strictly harder. To find out which is the harder question, come to the talk!

We will not assume any prior knowledge of logic, and all the fields we meet will be algebraic extensions of the rational numbers. Therefore, much of this talk should be accessible to anyone who has taken an undergraduate course on algebra and fields.