

Bi-State Math Colloquium

Who: Holly Attenborough

When: Thursday, November 8, 4:00 pm

Where: Ottensman 122, UW-Platteville

Extending Gauss's Lemma to Number Fields

This colloquium will be an exploration of a 2005 paper, "Gauss's Lemma for Number Fields" by Arturo Magidin and David McKinnon, published in *The American Mathematical Monthly*.

- Can every polynomial with integer coefficients be factored into linear terms, each with complex coefficients?
 - Yes! Fundamental Theorem of Algebra. Bam.

Now, let's restrict the question slightly by considering only those complex numbers which are roots of monic polynomials with integer coefficients, i.e. algebraic integers.

- Can every polynomial with integer coefficients be factored into linear terms, each with algebraic integer coefficients?

Gauss's Lemma states that the product of two primitive polynomials is primitive (a polynomial with integer coefficients is called primitive if the greatest common divisor of its coefficients is 1). We will extend both the notion of primitive and the lemma itself to polynomials with algebraic integer coefficients. This will enable us to answer our factorization question. The two principal tools used to extend Gauss's Lemma are the finiteness of the class number and unique factorability (of ideals) in algebraic number fields.

Holly Attenborough received her Ph.D. from Indiana University in 2013. She is an Assistant Professor in the Mathematics Department and a faculty advisor of the Math Club at UW-Platteville. Her obsession with Fermat's Last Theorem arose from reading the paper that will be discussed in this colloquium.