CCSU

DEPARTMENT OF MATHEMATICAL SCIENCES

COLLOQUIUM

Friday, October 18

3:00 – 4:00 PM

Maria Sanford, Room 101

THE UNSOLVABILITY OF THE QUINTIC AND IMPLICATIONS FOR SECONDARY MATHEMATICS EDUCATION

JOEY LOMBARDI

CENTRAL CONNECTICUT STATE UNIVERSITY

Abstract: In secondary mathematics, students spend a significant amount of time learning how to solve polynomial equations, and in particular, quadratic equations. They initially learn to solve some, but not all, of these equations by factoring and using the zero-product property. They later learn the method of completing the square and the quadratic formula, which can be used to solve any quadratic equation. It is also true that cubic and quartic equations can always be solved using their respective root-finding formulas. However, there is no root-finding formula that allows one to solve every fifth-degree polynomial equation. This fact is known as the unsolvability of the quintic, and the same result holds for polynomial equations of degrees higher than five. While this topic may not be taught in secondary school, it has a major implication for the way that solving polynomial equations is taught. I will discuss how the unsolvability of the quintic and related topics may be presented to secondary mathematics students. Historical developments of the derivations and proofs of the quadratic, cubic, and quartic formulas, and the unsolvability of the quintic will be included, as well as a proof of the unsolvability of the quintic that does not use the advanced abstract algebra concepts of Galois theory. Finally, a task will be presented that can be used to introduce the proof of the unsolvability of the quintic, and related concepts, to secondary students.