

CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES
COLLOQUIUM

Friday, April 12

3:00 – 4:00 PM

Maria Sanford, Room 101

THE QUADRATIC RECIPROCITY LAW

IVAN GOTCHEV

CENTRAL CONNECTICUT STATE UNIVERSITY

Abstract: The law of quadratic reciprocity allows us to determine if a quadratic equation with integer coefficients has an integer solution modulo a prime number. It was first conjectured by Euler in 1783 and the first incomplete proof was given by Legendre in 1785. In 1798, Gauss, in his *Disquisitiones Arithmeticae*, which appeared in 1801, gave the first two complete proofs. In this voluminous work Gauss referred to the quadratic reciprocity law as the “fundamental theorem” and, privately, he referred to it as the “golden theorem” in Number Theory. Later Gauss obtained several more proofs of that theorem and now, according to some sources, there are more than 240 known proofs.

In this talk, before we formulate and prove (if time permits) the quadratic reciprocity law, we will introduce the triple bar symbol (\equiv) for congruences, which is used in modular arithmetic, the Legendre symbol $\left(\frac{a}{p}\right)$, where the prime number p and the integer a are relatively prime. Also, some other great number theoretic results, necessary for the proof of the quadratic reciprocity law, will be mentioned, including Fermat’s Little Theorem and its generalization by Euler.

This talk is aimed for a wide audience of people who could enjoy good mathematical results.

To join us online use the following link: <https://ccsu.webex.com/meet/gotchev>
For further information: gotchevi@ccsu.edu; 860-832-2839; <http://mathcolloquium.sites.ccsu.edu/>