



UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Colloquium

Dr. Michael Williams
(UCR)

“Creating 3-dimensional spaces via surgery on knots and links”

Abstract:

One of the goals in 3-dimensional topology is to determine whether or not two given 3-dimensional spaces are topologically equivalent. The technical term for a 3-dimensional space is “3-manifold”. The most famous problem regarding 3-manifolds is the Poincare conjecture; this conjecture was originally given as a question by Henri Poincare around 1900, and this conjecture has been proved only recently. The Poincare conjecture asserts that any closed (i.e. compact and boundaryless), simply connected 3-manifold must be topologically equivalent to the 3-sphere. In 1910, Max Dehn considered surgery on knots in the 3-sphere as a way to construct possible counterexamples to the Poincare conjecture. Dehn was not able to find such a counterexample, but the method of surgery has proved useful to this day. An amazing theorem of Lickorish and Wallace asserts that if M is a closed, connected, orientable 3-manifold, then M can be obtained by surgery on some link in the 3-sphere. Much of my research centers around restricting the possible ways to create particular types of 3-manifolds via surgery. In this talk, I will give a survey of the aforementioned topics while providing illustrative examples. This talk should be accessible to a general mathematical audience.

Wednesday, February 27th, 2013

Surge 284

Tea Time 3:40 p.m. – Talk Begins 4:10 p.m.