

Department of Mathematics and Computer Science

Friday, September 8, 2017, 4:10 pm

COLLOQUIUM TALK

Speaker: Charles Delman (EIU)

Old Main 2231

Music of the Dandelin Spheres

or

Putting the Cone Back into Conic Sections

Abstract:

In this initial colloquium, aimed especially at students and mathematics educators, I will discuss the geometric properties of conic sections, using the elegant perspective introduced by the Belgian mathematician Germinal Pierre Dandelin. Absolutely no background is required aside from the most elementary geometry.

In secondary school we are taught that the intersection of a cone with a plane is either an ellipse, a parabola, or a hyperbola. However, the way these important curves are presented in the U.S. tends to be mathematically rather incoherent. Sometimes they are defined as the three quadratic curves, in terms of their standard general equations. Sometimes they are defined in terms of geometric properties, such as that the sum of the distances to two fixed foci is constant for the points of an ellipse. The algebraic descriptions may be readily deduced from the algebraic ones, and vice-versa, and some of these derivations may be carried out, but it should be apparent that something very important has still been left out. Namely, the cone!

In American classrooms, the plausibility of obtaining the shape of an ellipse, parabola, or hyperbola when a cone is cut at various angles may be conveyed by pictures, which is good as far as it goes, but rarely, if ever, is the discussion taken any further. Yet the ancient Greeks understood the geometric properties of conic sections long before Descartes and the introduction of analytic geometry. In the early part of the nineteenth century, the Belgian mathematician Dandelin introduced a beautiful method for seeing them more easily, but American students rarely, if ever, learn about it (or about the ancient Greek methods, for that matter). This talk aims to begin correcting this inexcusable neglect.

SNACKS IN FACULTY LOUNGE AT 3:30 PM.
EVERYONE WELCOME (EVEN IF YOU ARE UNABLE TO ATTEND THE TALK)
