

# Spring 2019 Undergraduate Seminar

Department of Mathematics



## You can't spell Physics without Pi

### Derek Orr

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**Date:** Tuesday, March 19

**Time:** 12:00 - 12:50 pm

**Location:** Room 703, Thackeray Hall

Derek is a third year graduate student at Pitt, studying math biology under Dr. Bard Ermentrout. He also went here for undergrad, majoring in math and physics and was President of the Math Club. As a grad student, he is a member of the GSO and has been a UMS organizer since 2016. You've seen what he looks like right? Here's a picture of his fiancée, Sarah, and their pup, Louisa.



Collisions between two masses  $m_1$  and  $m_2$  have two important quantities: momentum and energy, respectively given by

$$p = m_1v_1 + m_2v_2, \quad E = \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2.$$

Momentum is always conserved, energy is sometimes not (e.g. lost to friction). Imagine a small mass  $m$  and a larger mass  $M$ . Mass  $M$  hits  $m$ ,  $m$  hits a wall, bounces back, and hits  $M$  again. Mass  $m$  continues to bounce back and forth between  $M$  and the wall while  $M$  continues moving forward towards the wall (the collisions become more and more frequent). If energy and momentum are both conserved and  $M/m$  is the right ratio, the number of times the two masses bump into each other (before  $M$  changes direction) is related to the digits of pi! BUT HOW?!? Food and drinks will be provided!

Organized by: Derek Orr, Tom Everest, Jeremiah Morgan, Jeff Wheeler