

## ***TOPOLOGY SEMINAR***

**Guest Speaker: Mikhail Temkin**  
**Dartmouth College**

**Date:** Tuesday, April 12, 2022

**Time:** 2:30 PM

**Location:** 318 DeBartolo Hall

**Zoom Link:** <https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Fnotredame.zoom.us%2Fj%2F97262637721&token=ozmGlue3WtfCITePz9rbXp5PuRYVtqXydCaY%2BnguSa0%3D>

**Lecture Title:**

**On numbers associated with a strong Morse function**

### ***Abstract***

Morse function  $f$  on a manifold  $M$  is called strong if all its critical points have different critical values. Given a strong Morse function  $f$  and a field  $F$  we construct a bunch of elements of  $F$ , which we call Bruhat numbers (they're defined up to sign). More concretely, Bruhat number is written on each bar in the barcode of  $f$  (a.k.a. Barannikov decomposition). It turns out that if homology of  $M$  over  $F$  is that of a sphere, then the product of all the numbers is independent of  $f$ . We then construct the barcode and Bruhat numbers with twisted (a.k.a. local) coefficients and prove that the mentioned product equals to the Reidemeister torsion of  $M$ . In particular, it's again independent of  $f$ . This way we link Morse theory to the Reidemeister torsion via barcodes. Time permitting, we will also discuss how parametric Morse theory comes into play. Based on a joint work with Petya Pushkar, <https://proxy.qualtrics.com/proxy/?url=https%3A%2F%2Farxiv.org%2Fabs%2F2012.05307&token=yKVo3q1%2Fh5lSy76DVbT96JcTAH4LHRaoIeFW1UjWUiA%3D> .

