



Topology Seminar at Texas State

When: 12:30-1:50pm (CDT), Friday, November 13, 2020

Where: via Zoom (info below the abstract)

Speaker: Dr. William Boney

Topic: *The Joy of Concrete Categories*

ABSTRACT

A concrete category arises anytime you study sets with additional structure (and structure preserving morphisms). Which is to say that they are everywhere in mathematics: groups are sets with the group operation; graphs are sets of vertices with the edge relation; topological spaces are sets with a collection of open subsets, etc. Formally, these categories are concrete because there is a faithful functor into set given by the “underlying set” or “forgetful” map. We will give the necessary introduction and the relevant definitions to be able to discuss concrete categories. We will focus on two interesting results:

1. The concrete functor essentially forgets the structure, but what if you wanted it back? Rosicky’s “canonical language” gives a way of recovering the structure on a category by just knowing the maps between underlying sets. We will go through some examples to show how this construction works.
2. Given a category (presented abstractly as objects and arrows), how do you know if it is concrete? Isbell and Freyd answered this question by giving a necessary and sufficient diagrammatic condition. We will talk about examples of non-concrete categories and Kucera’s result that every category is *almost* concrete.

This talk may be of interest to algebraists. Additionally, I will mention several questions about concrete categories that are accessible to students.

ZOOM data:

Meeting URL: <https://txstate.zoom.us/j/99144581936pwd=TTUvc0tScmdCZjJndERtOXBZbGphZz09>
Meeting ID: 991 4458 1936
Passcode: manifolds