



Topology Seminar at Texas State

When: Friday, Nov. 20, 12:30 p.m.

Where: Online. Zoom info at bottom of page.

Speaker: Dr. William Boney

Title/Topic: The Joy of Concrete Categories II

This talk is a continuation of the previous talk. The Zoom recording of that lecture can be found at this link.

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 Information

Meeting URL: Click here.

Meeting ID: 991 448 1936

Password: manifolds